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ABSTRACT

This paper reports the analysis of data gathered during a six-week period in spring, 1983, in two junior high school classes in each of three subject areas: science, mathematics, and English. The purpose is to describe and propose some images or metaphors for depicting the processes associated with the enactment of tasks in these classrooms. Discussed is the development of an analytical language to deal with curriculum as a central dynamic of classrooms, rather than a context variable, specifying that students learn by processing information in subject matter domains. The cognitive levels of tasks were evaluated and related to educational outcomes. Data consists of narrative accounts of classroom events and processes, copies of materials used in class, and completed student work that had been graded by the teacher, as well as interviews with both students and teachers. Observer training and data collection techniques are described, and analysis procedures are reported. Class descriptions, commonalities across teachers, commonalities within subject areas, and task analysis are discussed. The paper concludes with an examination of anticipatory management of classrooms, reviewing how teacher, student, curriculum, and management variables intersect in constructing educative events in classrooms. Appendixes contain topic/task lists and content strands. (JM)

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Patterns of Academic Work in Junior High School Science, English, and Mathematics Classes: A Final Report

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PATTERNS OF ACADEMIC WORK IN JUNIOR HIGH SCHOOL SCIENCE, ENGLISH, AND MATHEMATICS CLASSES

The long and strenuous search for effective classroom practices has finally led researchers to examine the nature of the work students accomplish in classrooms and the learning opportunities that this work provides (see Doyle, 1983; Erickson, 1982; Good, 1983). At the same time, national attention is being focused on the substance of the curriculum and the quality of teaching and learning that occurs in our nation's schools. In line with these trends, the staff of the Research on Classroom Learning and Teaching (RCLT) Program at the Research and Development Center for Teacher Education is studying the management of academic tasks in classrooms (the MAT study). This research is an extension of a long line of inquiry at the Center into questions of teaching effectiveness and classroom management (see Emmer, Evertson, & Anderson, 1980; Emmer, Sanford, Clements, & Martin, 1982; Emmer, Sanford, Clements, & Martin, 1981; Evertson, Emmer, & Clements, 1980). A distinctive feature of the MAT study is an emphasis on curriculum and on the classroom processes associated with different forms of academic work. The MAT study is focused, in other words, on the arena in which management, instruction, content, and students come together to constitute a work system in classrooms. Knowledge about this arena promises to have important implications for research and practice in such areas as classroom management, curriculum development, instructional design, and teacher education.

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Phase I of the MAT study consisted of an investigation of academic tasks in junior high school science, mathematics, social studies, and English classes. The present paper reports the analysis of data gathered during a 6-week period in Spring, 1983 (from mid-January until the end of February) in two classes in each subject area. Phase II of the study is in the planning stages and will tentatively consist of a study of academic tasks in senior high school science and English classes. Sample selection for Phase II will be completed in Spring, 1984, in preparation for data collection in Fall, 1984.

The purpose of this report is to describe the general patterns or structures of academic work in six junior high classes and to propose some images or metaphors for depicting the processes associated with the enactment of tasks in these classrooms.

Background or Rationale

One of the central conceptual issues in the MAT study has been the development of an analytical language to deal with curriculum as a central dynamic of classrooms rather than as a context variable, that is, to include curriculum as a process variable rather than simply doing process research in designated subject matter classes. A brief discussion of the results of this effort is contained in this section.

Academic Tasks

The MAT study has grown out of an effort to define curriculum as a process variable using the complex notion of "task" (see Doyle, 1979, 1980, 1983). This notion, adapted from recent work in cognitive psychology and cognitive anthropology (see Calfee, 1981; Dawes, 1975; Laboratory of Comparative Human Cognition, 1978), provides a structure

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for examining the way in which actions in settings are ordered toward goals. A complete description of a task contains information about: (a) a goal state or end product to be achieved; (b) a problem space, that is, a set of conditions and resources available to accomplish the task; and (c) the inferred cognitive operations involved in assembling and using resources to reach the goal state.

As an approach to the study of classroom teaching, the academic task model specifies that students learn by processing information in a subject matter domain. How students process the information depends on what tasks they accomplish, that is, what goal states they are required to reach under specified conditions. The central point is that students encounter curriculum as a series of tasks to be accomplished with available resources and these tasks carry instructions for working with subject matter. Tasks instruct by specifying:

1. A product, for example, words in blanks on a worksheet;

2. Operations to produce the product, for example, copy words off a list, remember words from previous instruction, apply a rule (such as "Plural nouns use plural verbs") to generate words, or make up "creative" or "descriptive" words; and

3. Resources, for example, consult your textbook, do not talk to other students, do not use words from examples discussed in class.

In classroom studies, two other factors are emerging as significant in defining academic tasks. First, information is usually available to students concerning the significance or "weight" of the task in the accountability system of the class, for example, this exercise counts as a daily grade. Such information contributes to a student's understanding of the importance of the work to be done. Second, tasks

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vary in the degree to which they are congruent with other tasks in the overall task system of a class. Congruence affects the amount of previous practice students can bring to bear on a task. These factors reflect distinctive properties of classrooms as task environments, namely, the regular assessment of student products and the repeated meetings over a relatively long period of time.

The classroom environment influences tasks in two ways. First, classrooms contain resources that can be used to accomplish tasks, for example, content instruction, teacher and student talk about products, completed products to inspect, feedback to students about provisional answers. Second, tasks in classrooms are embedded in an evaluation system, that is, products are judged by the teacher and sometimes by peers. This evaluative climate (a) superimposes a goal structure that is not subject matter intrinsic, namely, getting a good grade; and (b) engenders a concern for ambiguity and risk, that is, what is a "correct" answer and how likely is it that my answer will be considered correct or that I will be given credit for my answer? Students can obviously accomplish the task of getting a grade in ways that circumvent the task of learning subject matter, for example, by copying work from someone else or working to create a favorable impression with the teacher (see King, 1980).

Teachers affect tasks (and thus learning) by defining the tasks students are to accomplish and by controlling access to resources, that is, by managing task-related interactions (teacher to student and student to student) and the availability of other information about task content and accountability while students are working. These processes are, of course, "jointly constituted" (Erickson & Shultz, 1981).

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Students and their teacher interact in complex ways to shape the work that is done in classrooms (see Carter & Doyle, 1982; Clark & Florio, 1981; Laboratory of Comparative Human Cognition, 1982).

The central purpose of the MAT study, then, is to examine the nature of academic tasks, the forms they take, and the configurations of events associated with their enactment in classrooms. This effort has kinship with classroom management research and has the structure of a process-process study, such as a study of the relation of teaching practices to student engagement. Indeed, the MAT study can best be seen as an amplification of basic classroom management research with a special emphasis on curriculum content and student information processing.

The analysis of MAT data is intended to lead to propositions about the structure of events in classroom environments, that is, how classrooms work. This knowledge of classroom structures will lead, in turn, to propositions about what teachers know about classrooms and how they process this information. Knowledge about teacher cognition has implications, finally, for designing content for teacher education (see Zumwalt, 1982).

Cognitive Level of Academic Tasks

Attention in the MAT analysis is being focused on the overall task systems that operated in the classes as well as the character of individual tasks. In addition, the study was designed with a special emphasis on academic tasks involving higher level cognitive processes. Some extension of the basic task model outlined above is necessary to clarify the meaning of this emphasis on higher cognitive processes.

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The cognitive level of a task is defined internally by the cognitive processes students use to accomplish it. Because these processes cannot be observed directly, it is necessary to infer the cognitive operations students use from a thorough description of the task itself, that is, the product, the operations specified by the teacher and those allowed to students in the setting, and the resources available to students while they are working on the task. In other words, an attempt is made to construct from observations a model to explain task accomplishment in a particular situation. A task involving higher cognitive processes is a task that students appear to accomplish with higher level cognitive operations. Although it is impossible to verify directly whether students actually used these operations on a particular occasion, research in cognitive psychology indicates that a model of a task goes a long way toward providing a model of information processing (see Dawes, 1975).

For purposes of this study, higher cognitive processes are defined as those requiring executive-level decision making, that is, decisions about how to use knowledge and skills in particular circumstances (see Doyle, 1983). The emphasis, in other words, is on the flexibility of students' knowledge and skills. In its most basic form, executive decision making is involved in recognizing transformed versions of information or algorithms previously encountered. At more advanced levels, executive processes include such operations as (a) selecting an algorithm or a combination of algorithms to solve a word problem in math, (b) drawing inferences from information given to formulate new propositions, or (c) planning goal structures for a writing assignment.

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Greeno (1983) has provided a useful example of a higher level cognitive process, namely, the process of constructing a semantic representation of a word problem in mathematics. He summarized evidence suggesting that expert problem solvers are able to recognize or construct patterns among quantities identified in a problem text. These patterns come together to form a semantic model or representation of the problem. This semantic representation is then used to select a formal model that specifies the operators or equations to use in solving the problem. Greeno (1983) emphasizes that:

> [Semantic representations] are not the same as the formal structures of mathematical relations or the equations of physics. What we have found in all the analyses of problem solving is that successful students form intermediate representations that include relations among the quantities in a problem. Formal methods of computation may be used in finding problem answers, for example, the formula for combining resistances in a parallel circuit may be retrieved and used to compute the equivalent resistance for the components. But the patterns of quantities are not the same as the formulas, and the research findings are consistent in supporting the conclusion that the relational patterns play a critical role in the processes of problem solving. (p. 7)

One way to visualize the analytical target of the MAT study is to think of a task as a definition of a gap in information that students are to cross with a cognitive act. Small gaps can be crossed by reproducing information previously encountered or by recalling and using a reliable algorithm. Larger gaps require that a student organize the task environment and connect what is known to the particular conditions

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of the task. One of the special purposes of the MAT study is to examine closely how these gaps are defined and maintained or adjusted by teachers and students in classroom environments.

Two additional points are in order. First, no attempt has been made at this stage of the MAT study to define a complete taxonomy of higher cognitive processes that might appear in academic tasks. There is some reason to argue that a generic taxonomy, that is, one separated from specific subject matter operations, is not especially informative when one is studying academic work (see Doyle, 1983). Moreover, an effort to organize knowledge about the cognitive level of tasks that actually occur in classrooms is best done after many of these tasks have been examined in the MAT data. Second, the emphasis on higher processes is not exclusive nor is it intended to suggest that all classroom tasks should be conducted at this level. Rather, this special focus is based on a recognition that higher order processes are generally considered to be an important part of the curriculum, especially in secondary schools. In addition, evidence from cognitive science (see Doyle, 1983) suggests that factual and algorithmic knowledge lacks both durability and utility if it is not embedded in executive decision processes.

The Problem of Outcomes

The richness of the MAT data would seem to provide an opportunity to ask interesting questions about classroom effects on students' cognitions. It is reasonable, therefore, to push the analysis toward questions of the effects of tasks on the enduring knowledge and skills students acquire (e.g., Do the students understand ratios and can they perform operations with ratios?) and on their evolving conceptions of content (e.g., What do they think mathematics is?).

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There are, however, at least two major problems involved in a direct study of task-outcome relationships. First, outcomes of a specific task need to be measured by a test keyed directly to that task. General achievement tests are not informative in such instances. Second, a preassessment is essential if effects are to be attributed to a particular task experience rather than to prior knowledge or general ability.

A model of how to go about measuring the achievement associated with particular instructional experiences has been provided by researchers interested in conceptual change (see Eaton, Anderson, & Smith, 1982; Erlwanger, 1975; Nussbaum & Novick, 1982; Posner, 1982; Posner & Strike, 1983; Stewart, 1983). In this work, a very specific concept, process, or operation in mathematics or science (e.g., how light enables us to see or how diffusion occurs) is identified. Clinical interviews with individual students are then used to map preconceptions prior to instruction on the topic and to assess outcomes after instruction has occurred. This close look at knowledge, instruction, and learning makes it possible to obtain a reasonably clear picture of specific instructional effects.

It is difficult to apply this work on conceptual change to the junior high school phase of the MAT study for at least two reasons. First, many different tasks were observed in the classes during the 6-week grading period. Second, it was difficult to know in advance what the tasks in the classes would actually be prior to observation. Preassessment under these conditions was virtually impossible.

Teachers and students were interviewed concerning their perceptions and interpretations of the tasks they accomplished. These interviews

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were conducted after the observation period was over in order to avoid intruding into the task systems in the classes. No attempt was made here to give a complete account of the views of the participants in the study. Rather, the purpose of the interviews was to learn how the teacher and students understood the overall task system in a class as well as the place of individual tasks in that system. It was hoped that this information would throw some light on the core problem of defining the cognitive level of tasks accomplished in the classes.

In the end, the question of outcomes in the junior high phase of the MAT study has been handled indirectly by focusing on the opportunities provided within tasks for students to practice various cognitive processes. Following the logic of "academic learning time," (see Fisher, Berliner, Filby, Marliave, Cahen, & Dishaw, 1980), it was argued that such opportunities are likely to be associated with student achievement. Nevertheless, direct connections between tasks and outcomes, as well as individual differences in achievement, were not a central focus of this study.

Summary

The MAT study represents an attempt to examine how various types of academic tasks, especially those involving higher level cognitive processes, are accomplished in secondary classrooms. In addition, an effort is being made to explore the problems of investigating the consequences of classroom tasks for student learning and for the development of expertise in subject matter. It is hoped that the products of these analyses will provide teachers with analytical tools for deliberating about important dimensions of teaching in classrooms (see Zumwalt, 1982) and supply a foundation for designing

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classroom-valid methods for promoting higher level thinking in various curriculum areas.

Design of the Junior High Study

The overall plan for the MAT study (Doyle, Sanford, & Emmer, 1982) includes data collection in junior and senior high classrooms. The junior high school phase was conducted in science, mathematics, and English classes. These subjects are of major importance in the curriculum as well as areas of national concern. In addition, they contain several different types of academic tasks about which a considerable body of cognitive research is beginning to accumulate (see Doyle, 1983). Finally, contrasts among tasks in these diverse disciplines was seen to be useful for learning about the nature and management of academic work.

Data collection was limited to two classes in each subject area because previous research (Carter & Doyle, 1982) indicated that tracing academic tasks requires continuous daily observations. In other words, to examine the intersection of management, instruction, students, and curriculum it is necessary to look closely at classroom processes. Because of the small sample, special care was taken to select teachers who had good classroom management skills and who used a variety of instructional tasks in their classes.

Data for the analysis of academic tasks consists of narrative accounts of classroom events and processes, copies of materials used in class (e.g., textbooks, work and assignment sheets, tests), and completed student work that has been graded by the teacher. In addition, interviews were conducted with teachers and selected students.

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Sample Selection

During Fall, 1982, school district instructional coordinators in science, mathematics, and English were asked to nominate six teachers in their content fields. In formulating their nominations, the coordinators were asked to consider four areas: (a) indicators that the teachers are effective in teaching the content of the curriculum; (b) evidence that the teachers are proficient in organizing and managing classroom activities (because the coordinators were familiar with the results of previous RCLT management effectiveness studies, they were sensitive to such indicators); (c) evidence that the teachers attempt to use a wide range of classroom tasks; and (d) evidence that the teachers take an active role in district-wide or regional events such as science fairs or writing projects. These guidelines were designed to help insure that the teachers nominated would fall within the upper range of effectiveness, have few management problems which might interfere with the description and analysis of academic tasks, offer a variety of classroom tasks, and be generally committed to the advancement of learning and teaching in their curricular areas.

After the nominations were received, teachers in mathematics and English were screened for empirical evidence of effectiveness in terms of class mean achievement gain over the previous 2 years. To complete the screening process, nominations were sent by the coordinators directly to the school district's research office. This office retrieved from district records achievement scores for the classes taught by nominated teachers for a 2-year period. These data, with teachers' identifications masked, was then sent to RCLT staff. Based on

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this evidence of past teaching effectiveness, two mathematics and three English teachers were selected for further consideration.

In junior high science classes, a valid measure of class achievement gain was not available, hence a somewhat different nomination and selection procedure was followed. Nominations of effective teachers were solicited from two sources in addition to the science curriculum coordinator: principals of all junior high schools in the District, and the University supervisor of the student-teaching program in secondary science. Nine teachers who were nominated by more than one source were contacted; seven indicated interest in participating and were selected for further consideration.

The total group of 12 teachers chosen for further consideration were visited by RCLT Project staff in early January. Staff members talked with the teachers about their program of academic work and observed one or more of their classes. The purpose of these observations was to become familiar with the events and processes in the teachers' classes and verify that the teachers were effective in managing academic work and offered a range of academic tasks in their classes.

Two teachers in each subject area were chosen based on indications of teaching and management effectiveness and the variety of academic tasks used in classes, as well as feasibility of observation schedules and contrasts between teachers' approaches. One average ability (as designated by school district criteria) class per teacher was selected for extensive observation. The classes consisted of two eighth-grade science classes, one seventh- and one eighth-grade English class, and

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one seventh- and one eighth-grade math class. Teachers received a $200 stipend for out-of-class time.

The students in the teachers' classes constituted the student sample for the study. Parents' permissions were obtained to examine students' completed and graded work and interview them. Six to nine students from each class were selected for interviews after the end of the 6-week grading period. Students for these interviews were selected to provide several levels of success in accomplishing academic tasks and of participation in lessons and other interactions with the teacher.

Observer Training

Observers/analysts for the study included four senior researchers with experience in writing classroom narratives, namely, Doyle, Sanford, Emmer, and Clements. In addition, two junior level observers with graduate course work and teaching experience in science and English, respectively, were hired for the project. These two observers worked with senior researchers on the teams in science and English.

The staff of the RCLT Program has had extensive experience writing narrative records of observations in elementary and junior high school classes for previous studies of classroom management (see Emmer et al., 1981; Evertson, Anderson, Emmer, & Clements, 1980; Evertson et al., 1980). To orient the staff to the specific purposes of the present study and to prepare new observers, a manual was written which gives general guidelines and specific questions to be answered in the observation and analysis phases of the research (see Doyle et al., 1982).

The following steps were followed in training observers for the study:

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1. Observers read several documents related to the study of academic tasks, specifically, Anderson, Spiro, and Montague (1977); Calfee (1981); Carter and Doyle (1982); Doyle (1983); and Resnick (1981, 1982).

2. Observers met to discuss the study and explore the problems of analyzing academic tasks. In these sessions, examples from Carter and Doyle's (1982) study of academic tasks in junior high school English classes were examined.

3. Observers practiced analyzing academic tasks in a narrative of a high school biology class which included textbook and laboratory work. The format of this phase of training consisted of having each observer/analyst work independently to identify and analyze tasks and then meet to discuss findings and any differences among analyses.

4. The same procedures as in Step 3 were followed for the analysis of a narrative from the Junior High Classroom Management Study (JHCOS) conducted previously by the RCLT staff. This narrative was done on a junior high school mathematics class.

5. Observers then practiced writing narratives from a full-period videotape of a junior high school English class. This step gave observers experience in constructing narratives following the procedures outlined for the present study. These narratives were compared closely and a high degree of agreement was found. In addition, the tasks accomplished in the class that day were analyzed by each observer and these analyses were compared.

6. Observers then practiced analyzing tasks in a set of continuous narratives. This set consisted of narratives of four consecutive classes from Carter and Doyle's (1982) study of junior high English

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classes. Again, the analyses were conducted independently and then compared for agreement and differences.

7. The final stage of training occurred during the preliminary observations of nominated teachers to select the final sample for the study. All observers wrote and analyzed narratives for at least one class. Junior level observers were accompanied by senior researchers so that their narratives could be compared for reliability and validity.

Data Collection

Classroom observations. Each observer was assigned to observe a single teacher every day during a 6-week grading period. (One teacher was observed an additional week in order to see all of the tasks related to the unit observed.) During each observation, the observer was responsible for generating a narrative description of classroom events and circumstances affecting academic tasks in that teacher's class. Observers took rough notes in class and then dictated as soon as possible a complete narrative on tape. When possible, observers recorded verbatim task-related statements made by the teacher or students. Typed copies of the dictated narratives were given to observers for analysis.

In constructing the narrative records, observers concentrated primarily on information that defined the nature of students' products and the conditions under which they were produced. Such information included teachers' formal directions (written or oral) for assignments; teachers' responses to students' questions about assignments; resources made available to students in the form of materials and references, models of finished products, and opportunities to share work with other students or to get interim feedback from the teacher; statements about

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grading policies, extra credit, and accountability; and remarks about the relationships among various aspects of work (e.g., how a grammar lesson on abverbs was related to a descriptive paragraph assignment). In addition, observers kept a record of time and provided a running account of classroom events focusing on such dimensions as student participation and engagement (general estimates), teacher location and movement in the room, sources of student-initiated questions, and other indications of the flow of work in the classroom. Information concerning the physical setting of the classroom and location of students was also recorded.

During data collection, observers/analysts met four times to discuss problems, insights, and preliminary work on task analyses. In these meetings interview questions for the teachers and students were also generated.

Reliability check. The design of the study required that observers work in teams so that continuous interactions could occur to maintain accuracy and to sensitize observers to dimensions of academic tasks which needed attention. During the second and fourth weeks of the observation period, members of each subject matter team observed together in each other's class. Following these observations the subject matter teams met together to compare dictated narrative records for reliability and to share impressions.

Instructional materials. Because of their major role in defining tasks, copies of assignment sheets, worksheets, textbooks, and other materials used by the teacher and students were collected. In addition, information on chalkboards or posters in the room was copied. When necessary, observers asked teachers informally to clarify requirements

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or explain routine assignments, particularly those that were started before observations began. In addition, observers obtained copies of materials previously given to students describing general classroom policy, procedures, and expectations.

Graded student work. Work that students completed was examined after it was graded by the teacher to ascertain what the students actually did in accomplishing a task and how the teacher actually evaluated their products. In particular, observers looked for:

1. The correspondence between stated task requirements and the final products (i.e., how well did the students do in comparison with what the teacher seemed to establish as criteria in the announced requirements);

2. Patterns of students' errors or areas of difficulty;

3. The focus and general character of teacher comments;

4. The grades students received; and

5. Any correspondence between prompts or models given by the teacher in class and the content of student products.

Observers recorded student grades and written teacher comments and made copies of important or interesting assignments.

Teacher interviews. After the observations were completed, all teachers were interviewed concerning the following themes:

1. How does the grading system work in your class?

2. Which assignments do you consider to have been the most important during the 6-week grading period? Least important?

3. How did you set up assignments at the beginning of the year? What standing patterns or routines operate for work in your class?

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4. What are the major purposes you were trying to accomplish during the 6 weeks? Where were you most successful? What frustrated you?

5. Why do students work in your class? Do you think grades are important to your students?

6. On what kind of work do you allow (or encourage) students to work together? Can you give your reasons for this?

With regard to tasks specific to their classes, teachers were asked about goals and objectives, the operations they had in mind for students to use in accomplishing the tasks, and their views of the success of the tasks. When necessary, observers had teachers clarify general policies and procedures for academic work that were not clarified during the course of the observations. During the interview, observers also obtained copies of grade records for the class and an explanation of the formula used for computing the final course grades. Interviews lasted from 1 to 2 hours.

Student interviews. The student interviews were intended to provide some perspective on how junior high students view academic work and its accomplishment. The observer in each class selected six to nine students for interviews. Students who were of potential interest were: (a) students who frequently solicited information from the teacher which served to clarify or alter the task; (b) students who were consistently successful in accomplishing work; (c) students who did not play active roles in classroom interaction but who accomplished work successfully; (d) students of high or low ability who appeared to have difficulty in doing the work; and (e) students who appeared to accomplish tasks through strategies other than what was expected or intended by the teacher.

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Students were interviewed individually after the grading period was over to avoid disruptions in the natural flow of academic work in the classes. Students were questioned about the following themes:

1. Was the work in this class easy or difficult? Why?

2. Do you usually understand the work you are assigned? What does the teacher do to help you understand? What do you do if you are confused?

3. Do you usually have enough time to do your work?

4. Which assignments this past 6 weeks were most important? Least important? How did you know this?

5. What was your grade for the 6-week period based on?

6. What does it take to do well in this class?

7. Do you often participate (talk) during class discussions in this class? Why or why not? Do you think it is important to participate in this class?

In addition, students were asked questions about some specific tasks they did in class. Interviews lasted about 15 minutes and took place in a room near the classroom.

Analysis Procedures

Defining Academic Tasks

As indicated previously, the concept of "task" provides a general analytical framework for defining the nature of students' work. This approach was adapted from the methods used by Carter and Doyle (1982) and represents a qualitative approach to data gathering and analysis (see Bogan & Biklen, 1982; Erickson, 1979; McDermott, Gospodinoff, & Aron, 1978). In defining tasks, attention is directed to the products students generate for the teacher (such as test papers, completed

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worksheets, papers, oral reports, etc.) and to the events leading up to the creation of these products. A student product usually signifies the completion of a task. The type of task involved in the creation of a product depends upon the operations students are required to use and the conditions under which the work is done. The role of a particular task in the overall task system of the class depends upon the weight placed on the assignment in the teacher's grading policies and upon the relationship of content of the task to content of other tasks in the system.

Preliminary Data Reduction and Mapping

Each observer/analyst was responsible for generating a description of the academic tasks operating in the class of his/her assigned teacher during the 6-week grading period. Once the observations were completed and narrative records were typed, observers/analysts began a detailed analysis of the tasks seen in their assigned teachers' classes. Information obtained from in-class observations, instructional materials, student products, and informal and formal interviews of teachers and students was used to produce: (a) a topic list, (b) a task list, (c) task analyses, (d) teacher/task system summaries, and (e) student case studies.

Topic lists. Topics or assignments for each class were listed in the order in which they occurred. On occasions when students' products were handed in to the teacher for summative grading an asterisk (*) was placed beside the numbered item on the topic list. The topic lists provide an overview of content instruction, tasks, and other activities accomplished in each class during the observation period.

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Task lists. Task lists contain a brief description of each task, the date on which it was completed, the number of sessions in which direct time was devoted to introducing or working on the task, and the approximate time devoted to the task. In addition, tasks were classified as major or minor based on information from the narratives concerning the importance or weight assigned by the teacher to each task during the observation period.

Task analyses. Once tasks were identified, observers/analysts began the process of describing the components of each task. Tasks that appeared to involve higher cognitive processes were given special attention. Analysis of a task was accomplished by reading all of the narratives related to the task and examining related materials and student products. Many tasks, especially major ones, were accomplished over more than one class session and involved several episodes of content instruction or several closely related minor tasks.

Beginning with major tasks, each task was described in terms of six general categories. Specific questions guiding analysis in each category were provided in an observer/analyst's manual (Doyle et al., 1982). Briefly, the categories are:

1. Time devoted directly to introducing or working on the product and indirectly to assignments which are related in substance to the product (e.g., reading a story which becomes a topic for a writing assignment);

2. The assignment as defined by teacher statements over the course of time spent working on the product, including both formal directions and answers to student questions or other remarks during work sessions;

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3. Prompts or other resources made available to students during the course of working on a product;

4. Accountability or grading policies including those defined initially by the teacher, adjustments to these policies, bonus points or other opportunities to earn credit which can be applied to the product, and grades actually given by the teacher;

5. Process, including a description of the events that occurred in class during time spent working directly on the product and an analysis of student success on the product and its components; and

6. The general nature of the task, especially the cognitive demands of the task, including both intended or announced operations for task accomplishment and actual operations which could have been used to produce the final product.

Production of the task analyses provided a framework for identification and exploration of potential themes for further exploration and discussion. Thus, as an analyst sifted through classroom data to uncover the resources for a task, or tried to assess cognitive operations students were likely to have used in completing a task, insights about management of different kinds of tasks, about problems teachers have in conducting content instruction effectively, and about the impact individual students can have on class work began to emerge. In addition, the process of task analysis called attention to different patterns of relationships and linkages among tasks in the different classes in our sample.

General Patterns of Academic Tasks

This paper is focused on the general patterns of academic tasks in the six classes. The first section of the paper is directed to the

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content strands in each of the classes, that is, the sequences of tasks and the thematic integration of these tasks into overall content structures or schemata. This effort to construct general models of task systems is seen as useful in explicating the character of the academic work students do and the logic of the content they encounter in classes. The second section of the paper contains an analysis of different types of academic tasks, from those involving memory to those requiring higher levels of cognitive processing. The third section concentrates on the dynamics of task enactment with special attention to the issues of how students and teachers manage complex academic tasks and how their maneuvers shape the nature of academic work. The fourth section contains a description of a smoothing and leveling of the curriculum by what appears to be an anticipatory management of tasks, that is, the avoidance of task complexities in favor of a production system containing high familiarity and few surprises. The paper concludes with a discussion of implications of the analysis of academic tasks for understanding curriculum and teaching effects.

Subject Matter Strands

Although the total number of classes is relatively small, the total number of tasks was large: Approximately 200 tasks were accomplished in the six classes. Some general task forms were seen across several classes: text or ditto assignments where students read a selection over new material and then responded to questions; routine review or practice exercises; laboratory experiences with corresponding reports and questions; tests assessing recall-level objectives; tests requiring comprehension and application operations; and composition tasks, including research reports. On the other hand, there was considerable

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variety across classes in the number and kind of tasks observed. Students in one math class completed 49 tasks while students in one science class completed only 14 tasks, with 80% of total task time in this class devoted to only 6 tasks.

To gain some perspective on the character and variety of these tasks, attention turns first to descriptions of individual classes and then to the character of academic tasks in each of the subject matter domains represented in the study.

Description of the classes. Teacher 1 taught eighth-grade combined life/earth/physical science. There were 25 students in the class, 13 male and 12 female. The class was heterogeneous with regard to prior academic achievement and consisted of 18 Anglos, 1 Black, 5 Hispanics, and 1 Oriental. It met in a large, well equipped room which included both a regular classroom desk arrangement and six laboratory tables for student lab activities. This class was characterized by relatively few tasks (14) and included several long-term assignments; many laboratory experiences and class discussions; and an emphasis on development of problem-solving and reasoning skills. In addition, students wanting a B in the class could complete, out of class, one of three optional or extension tasks, and those wanting an A had to complete one of three additional tasks (only 12 of the 25 students completed one or more of these assignments). The content of tasks during the period observed focused on two related units: (a) the metric system and laboratory measurement (6 tasks) and (b) scientific research methods (8 tasks). Because the second unit was not completed during the 6-weeks observation period, this class was observed an additional week.

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An analysis of content strands in Teacher 1's class suggests that her task system was tied together by a strong semantic thread. Major and minor tasks within units were closely interrelated and build upon one another in a careful logical progression. In addition, the optional tasks were thematically related to the core tasks. Finally, the teacher often required students to apply concepts and procedures to novel situations and problems, thus pushing students to understand the content. At the same time, time allocations were generous and flexible, students were allowed to work together on tasks, and the teacher often gave corrective feedback before papers were handed in for grades. Even on tests, students were allowed to use their notes and graded papers. Particularly at the end of units, students who were often absent or who worked quite slowly were given ample time, strong prompts, and opportunities to get help from other students. Finally, the observer noted that students had only limited amounts of independent practice on most tasks and that daily management of the class, especially in the areas of accountability, monitoring student progress, sustaining task involvement, and controlling time allocations was sometimes difficult. In other words, the teacher had a strong content system, but the enactment of this system occasionally had ragged edges.

The companion class in this subject area was an eighth-grade science class taught by Teacher 6. This group of 28 students was comprised of 14 Anglos, 13 Blacks, and 1 Hispanic. Students in this class completed 30 tasks related to aspects of the circulatory and digestive systems. Typical tasks required students to read a passage and answer questions, do laboratory activities and record procedures and findings, or identify structures. In addition, all students were

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required to complete a science fair project during the observation period.

Activities in Teacher 6's class ran very smoothly, and students were quite productive. The work itself, however, had three distinctive characteristics. First, virtually all tasks were minor tasks. That is, all tasks were accomplished within one or two class periods and each counted as only a very minor portion of the grade for the 6 weeks. Second, all tasks were self-contained, that is, the information necessary to complete the work was given within the materials for a task so that integration or assembly across tasks was unnecessary. Moreover, the teacher did not overtly tie tasks to lectures or lectures to laboratory or worksheet tasks. Finally, the ordering of the tasks was episodic rather than semantic, that is, units did not begin with an introduction and lead to an integrative culmination. Rather, tasks covering parts of the unit were assigned before the introductory lecture, and textbook summaries of units were scheduled after several discrete tasks were already completed. All the information was there and often repeated, but tasks were treated as independent and interchangeable pieces. In addition, tests, which measured at the level of recognition, covered only selected aspects of the total unit.

In Teacher 2's seventh-grade English class, there were 12 boys and 17 girls (20 Anglos, 4 Hispanics, 4 Blacks, 1 East Indian) of several ability levels. Teacher 2 used 17 tasks to teach grammar, spelling, punctuation, and writing. Spelling assignments were taken primarily from the textbook. For grammar and punctuation, Teacher 2 generally explained the rule, provided models of correct usage, and had students complete short exercises (e.g., sentence completion). Writing

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assignments usually followed a prescribed format and incorporated spelling words, specific grammar aspects and/or punctuation that had recently been studied. In other words, the teacher used writing assignments as occasions to practice other aspects of the English curriculum.

Analysis of content strands in this class indicates that most of the major tasks (and thus most of the time and the greater part of the final grade for the 6 weeks) were associated with spelling tests and two writing assignments: a "reasons" paragraph and a "changes" assignment. The only major task outside these areas was a comma test in the punctuation strand. It is interesting to note that a considerable amount of class time was spent explaining and working on a comparison and contrast writing assignment but no product was handed in for a grade during the 6 weeks of observation. The observer noted that Teacher 2 was very thorough and explicit in presenting assignments and in helping students complete them. Especially for major writing assigments, the teacher offered opportunities for corrective feedback before work was handed in for credit.

Teacher 3's eighth-grade class was comprised of 13 boys and 13 girls: 15 Anglos, 9 Hispanics, 1 Black, and 1 Asian. There was a wide range of ability in this average level class, and the teacher made a special effort to assist lower ability students and encourage their participation in whole-class lessons. Spelling and grammar formed the core of the 24 tasks for this 6-week term. Spelling tests were part of the regular weekly routine, and a test on 50 words drawn from weekly units was given at the end of the term for a major grade. Grammar instruction was focused on pronoun and verb usage, and the teacher

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devoted a large amount of time to teaching specific algorithms for selecting the correct form of pronouns and verbs. In addition, she provided ample opportunity for practice and review. Writing instruction consisted of daily entries in journals and a "perfect paragraph," that is, a paragraph that could be handed in up to four times for feedback before a final grade was given. Finally, the teacher required students to correct all graded work and keep it in notebooks. At the end of the term, they were given a notebook test for which they were expected to be able to retrieve specific information about items on assignments and tests.

Teacher 4 taught an average ability eighth-grade math class with 15 Anglos, 11 Hispanics, and 1 Black (14 boys and 13 girls). The content of the 49 tasks completed during the observation period included ratios, proportions, and percent. At the end of the observation period, students were expected to be able to solve word problems with proportions, discounts, sales tax, and interest rates. Concepts were introduced by the teacher in class and numerous models presented. Students practiced the concepts in a variety of seatwork and homework assignments which were checked and reviewed in class.

A typical session in Teacher 4's class consisted of the following sequence: warm-up exercise, checking homework, review of homework, introduction to new content, and seatwork over new content. Topics and procedures were explained thoroughly, and the teacher monitored student work closely. The teacher followed order of topics in the textbook fairly closely (although supplementary materials were also used), and there was a considerable amount of semantic progression and integration as each lesson built systematically toward a culminating test.

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Especially toward the end of the term, the teacher occasionally mixed problem types and included word problems in warm-ups and seatwork assignments so that students were required to select the appropriate procedure to use in solving problems. The observer noted that student errors on tests were more likely to occur in computational stages rather than in translating the problem's information to the first step of the computational algorithm.

In Teacher 5's seventh-grade math class, there were 16 boys and 13 girls: 13 Anglos, 12 Blacks, and 4 Hispanics. The class was an average ability class, but included several outlying low or high ability students. During the observation period, the teacher introduced the concept of percent in very small steps. Students completed a large number of tasks providing practice on each new skill or concept. In addition, they had daily assignments designed to reinforce and evaluate skills taught earlier in the year.

A typical class period for Teacher 5 consisted of the following sequence: 10-20 warm-up problems (with bonus problems for students who finished early), oral checking and discussion of warm-up and bonus problems, short presentation of new content, short seatwork activity related to the content presentation, and a seatwork activity covering previously taught skills. The teacher worked closely with individual students during warm-up and seatwork segments. The teacher used four main types of tasks: application tasks (warm-up problems requiring different skills), reinforcement tasks (guided practice on new skills), review tasks (covering a skill learned earlier in the year), and assessment tasks (tests in which students demonstrated attainment and retention of skills).

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The content strands for Teacher 5's class suggest an interesting pattern of repetition and accountability. Several interrated strands involving operations with whole numbers, fractions, and decimals operated simultaneously and were encountered on a variable schedule. These strands constituted the "old" content covered previously. "New" content involving the conversion of fractions to decimals, decimals to fractions, and the introduction of percent was introduced along with old content which was often thematically related to the new content. Students were held accountable during this term, however, only for old content.

Commonalities across teachers. Four general impressions about the teachers in this study are useful. First, the teachers were, with some variation, skillful managers. Work involvement and productivity among students was typically high and no serious disruptions or continuing patterns of inappropriate classroom behavior were observed throughout the 6 weeks. Second, the teachers were very explicit and thorough in explaining content and procedures and in helping students complete the assigned work. Third, the teachers provided ample time and multiple opportunities for students to complete the assigned work. Finally, there was, with one exception, a strong semantic thread running through the content strands which served to tie separate tasks together.

Commonalities within subject areas. Before focusing on the general patterns across task systems, it is helpful to examine, at a descriptive level, the commonalities within the subject matter domains of science,

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English, and math. Given that only two teachers in each subject were observed, these comments have quite limited generalizability. Nevertheless, they give some sense of subject matter characteristics in the data.

The greatest contrast between classes existed in the area of science. Teacher 1 devoted the 6 weeks to measurement and experimental design, topics that are not often covered in great depth in junior high school science classes. Moreover, tasks were defined broadly, and separate tasks were clearly presented as components of a larger content picture. The emphasis, in other words, was on meaningful units of content and the setting of experiences that would make these units meaningful to students. At the level of daily activity, the schedule was loose, and accountability and productivity were not dominant themes. Teacher 6, on the other hand, covered circulation and digestion, topics which are commonly covered in junior high science, and daily productivity was high. These topics contain a great deal of factual information as well as complex biological processes, and the sheer amount of information would make this a difficult area to deal with under any circumstances. The emphasis in this class was on discrete pieces of the content rather than integrative conceptions, and the content strands and many of the tasks were only loosely tied together. One gets the impression that the class was driven by the logic of classroom management (i.e., keeping students engaged in work) rather than the logic of the content. The students did a lot of science-like work--labs, worksheets, textbook reading, etc.--but it was not clear that any overall meaning was built into the system. In sum, these

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classes represented quite different interpretations of junior high school science.

The English classes of Teachers 2 and 3 were similar in several respects. In both classes, spelling represented, in terms of time expenditure and grade credit, a major strand running through the 6-week term, and literature received only passing attention. There were also differences. Writing in Teacher 2's class was a highly developed strand, whereas grammar was a central element in Teacher 3's class. From the perspective of subject matter, the classes contained distinct strands of content: spelling, grammar, vocabulary, writing, and literature, although especially within the well developed strands there was considerable thematic integration. Some attempt was made by Teacher 2 to cut across strands by incorporating some grammar and vocabulary elements into writing assignments. Nevertheless, the individual strands were distinct in logic and texture, and these differences appeared to be intrinsic to the English curriculum itself. English, in other words, seems to require that the teacher sustain multiple strands that only occasionally intersect.

At the level of task systems, mathematics for Teacher 4 looked in many respects like science for Teacher 1. That is, individual tasks were ordered and integrated around broad content themes, namely, ratios, proportions, and percent, and there was a clear emphasis on understanding these concepts. The major difference was that daily activities in Teacher 4's class were quite systematic and production oriented, whereas the work system was looser in Teacher 1's class. Math for Teacher 5 appeared to be a set of somewhat discrete skills (e.g., operations with whole numbers, fractions, and decimals) that needed to

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be practiced and mastered independently. In this sense, math was similar to English with its separate content strands. At the same time, there was a weak content progression as Teacher 5 introduced new skills (e.g., conversion of fractions to decimals and using percent) that built upon previously mastered skills. In contrast to Teacher 4, Teacher 5 appeared to emphasize math procedures more than math concepts.

This preliminary attempt to describe content differences is intended to stimulate thinking about curricular constraints on task systems. At this point, there would appear to be an interaction between curriculum and a teacher's interpretation of that curriculum. English contains distinct strands. Math viewed as a collection of skills can end up with strands that are only loosely connected by integrative conceptions. Similarly, science seen as a collection of facts, topics, and exercises can be enacted as a collection of discrete and interchangeable pieces. On the other hand, discrete strands in English as well as overall task systems in science and math can be organized primarily around integrative conceptions such that tasks become progressively more comprehensive. When the latter interpretation prevails, one tends to see more incidents of higher level cognitive processing.

Structural features of tasks. There is a small amount of information emerging from the analysis to suggest that there are structural features of academic tasks that define their place in the work system of a classroom. This property of academic work was evident for the "perfect paragraph" assignment in Teacher 3's English class. The assignment, which counted as a major grade for the 6 weeks, consisted of a single paragraph on a topic of the student's own

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choosing. The paragraph could be handed in on four occasions for formative grading and feedback from the teacher before the final deadline. If along the way the teacher considered the paragraph "perfect," then no more work was required. Until perfection was reached, however, the paragraph could be rewritten and handed in again.

In general, the students' response to this assignment was curious. Most of the higher ability students did not do the assignment until the last time, after several pointed reminders from the teacher, and in some instances they received low grades. During interviews, these students reported that they regularly "forgot" to do the paragraph. Several of the lower ability students attempted the paragraph early in the term, and during the interviews they described it as an "extra credit" assignment. In one instance, a lower ability student handed the paragraph in for the first time, was satisfied with the C he received, and failed to hand it in on the last day. Only a few students seemed to understand the assignment fully and take advantage of the opportunities for feedback from the teacher.

A compelling explanation for this pattern of student behavior can be constructed around the premise that the task was perceived as an "extra credit" assignment despite its definition by the teacher as a major grade task. In addition to being defined this way by lower ability students, the assignment had several "extra credit" properties: Only a very limited amount of time was spent working on the assignment in class and risk was low because the paragraph could be handed in several times. Because higher ability students in this class tended not to do extra credit assignments, they typically forgot to do their paragraphs. Lower ability students, who were more likely to try for

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extra credit, began the assignment early but did not seem to understand the need to hand it in several times.

A similar pattern was noted in Teacher 1's science class. Students who want to earn a B in the class had to complete one of three optional assignments and those who wanted an A had to complete an additional one of three other optional assignments. Although some in-class time was was allowed for these assignments, most students who chose to do these assignments worked on them outside of class sessions. Only 12 of 25 students elected to do these optional assignments and some appeared to treat them as extra credit. Indeed, one of the most capable and regularly high scoring students in the class accepted a C on her report card rather than complete an optional activity.

If this interpretation is accurate, it suggests that there are distinct structural properties associated with different types of work assigned in classrooms and that this structural definition can override specific directions from the teacher. Are there other manifestations of this effect? For example, does the use of bonus points with an assignment tell students that the work is not going to be graded by strict criteria? Certainly the present analysis indicates that more attention needs to be given to factors that define the character of work for students.

Types of Tasks

Doyle (1983) proposed that academic tasks could be divided into four categories in terms of the underlying operations involved in their accomplishment: memory, routine or algorithmic, opinion, and understanding. In the MAT classes these categories were certainly evident. Many of the tasks clearly involved remembering information

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previous encountered or the application of a reliable algorithm to generate a set of answers. And in some instances, it was fairly clear that the students needed to understand the content to interpret word problems in math, design an experiment in science, or select the correct pronoun to complete a sentence. But the overall impression is that distinguishing between lower and higher level task requirements in classrooms is difficult to do and that this simple distinction does not necessarily capture important dimensions of classroom processes associated with academic work. As a result, an attempt was made to explore alternative ways of depicting the differences among tasks as they appear in classroom environments.

Major vs. minor tasks. The distinction between major and minor tasks was introduced to reflect some obvious differences in the amount of time and grade credit assigned to various types of academic work. For example, a major test based on content dealt with over a 2-week interval might count for one sixth to one fourth of the final mark for a 6-week term. Minor tasks, on the other hand, typically are completed in one or two class sessions, and grades on these tasks are averaged with several other grades before they contribute to the final mark. For analysts, this distinction is relatively easy to make because teachers often announce major tasks explicitly. It is not always clear, however, that students are always aware of the differences between major and minor tasks.

The analysis of tasks sorted initially into major and minor categories on the basis of time and credit is beginning to reveal some interesting patterns. First, in semantically integrated task systems such as Teacher 1's science or Teacher 4's math, minor tasks (e.g.,

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exercises) represented occasions for practice leading to major tasks (e.g., tests or writing assignments). In multiple strand classes such as English, minor tasks were also used for weakly developed strands such as literature or vocabulary. In Teacher 5's skill-based math class, the distinction between major and minor tasks was less prominent than it was in the other classes, and the impression was given that all work counted. Nevertheless, the teacher did assign differential credit to different tasks. Finally, in Teacher 6's science class, all tasks were equal, reflecting the interchangeability of tasks in this task system.

Accountability and credit weave curious paths through major and minor tasks. In one sense it appeared that standards of accountability were more stringent for minor tasks: Items were either correct or incorrect and prompting was minimal. On the other hand, the teachers typically handled grading of major tasks, whereas students often exchanged papers for grading minor tasks, suggesting a differential importance in the teacher's eye. Moreover, major tasks counted more heavily in grading for the term and were typically more complex than minor tasks. In other words, the consequences of major tasks were greater and accomplishment was more difficult. It appears, then, that the teachers were more careful in handling accountability for these tasks. In Teacher 3's English class, for instance, the first spelling test for the term was repeated because the teacher was concerned about the low grades students received. It would have been unlikely that the teacher would have repeated a minor task because of low grades.

Familiarity vs. assembly. Unraveling the paths of accountability in task systems as well as understanding the differential character of major tasks required a distinction at another level. A useful

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distinction emerging from the analysis is one between familiarity and assembly. In this section an attempt is made to explicate this distinction.

The analysis of patterns of academic work has pointed to the importance of context in defining the character of academic work. Tasks that appear on the surface (e.g., in teacher presentations to the class or in tests students take) to elicit comprehension or analytical skills are often accomplished in circumstances that alter fundamentally the character of their demands on students. For example, Teacher 3 (English) administered a pronoun test during the first week of observations--on Thursday, January 20. The test required that students be able to (a) recognize personal pronouns in a paragraph; (b) select the proper form of "its" or "it's" to complete sentences; (c) choose the correct form of personal pronouns to fill blanks in sentences; (d) write sentences with personal pronouns defined by their position on a pronoun chart; and (e) fill in all the blanks in a pronoun chart. The test appeared to demand a considerable mastery of pronouns. Yet, there was a high congruence between the exercises students completed prior to the test and the sections of the test itself. In other words, the students had considerable practice identifying pronouns in paragraphs, distinguishing between "its" and "it's" to complete sentences, selecting pronoun forms to fill blanks in sentences, and putting pronouns into cells on the pronoun chart. Although the exact items from exercises were not repeated on the test, it is likely that the test environment was quite familiar to students and that recall and application were simplified substantially by this familiarity. In the end, it is not easy to describe precisely what the cognitive demands of this task were.

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It is clear, however, that simply accepting the teacher's definition of the task in class or analyzing the cognitive demands of items on the test outside the instructional context could lead to an inadequate representation of the task students accomplished.

Preliminary analyses of examples such as this suggest that tasks in classrooms differ on two basic dimensions related to the amount of student decision making: (a) the familiarity of the task environments, and (b) the amount of assembly of different pieces of information or types of operations that must be done to construct a product. Familiarity refers to the similarities in task elements across occasions in which students work with a particular content strand, such as pronouns, algorithms for adding fractions, or descriptive paragraphs. The analysis of this dimension directs attention to the amount of intellectual work students must do to connect what they know to the particular problem or product they are working on. In the example from Teacher 3's class described above, for instance, there was a high degree of similarity across occasions in which students worked with personal pronouns, a factor that appeared to simplify the tasks and reduce the cognitive demands on the students. Assembly focuses on the extent to which students are required to put information or operations together in ways they have not previously seen. Tasks in math that are high in assembly, for example, would involve such processes as combining algorithms already learned into a chain of operations, or selecting from a set of algorithms those applicable to a particular problem. Some tasks of this nature were found in Teacher 1's science class and Teacher 4's math class. It would seem clear that these dimensions are

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closely associated with the cognitive level of tasks accomplished in classrooms.

From the perspective of student performance, there was also a difference between familiar and assembly tasks. In general, as the complexity of the operations required to accomplish a task increased, rates of errors and noncompletion of work increased. That is, fewer students were able to do the work or, at times, attempted to complete it. When assembly tasks did occur, it was much more difficult to sustain productivity in a class.

The issue of accountability becomes more sensible when it is viewed from the perspective of task familiarity. In general, routinized and familiar tasks, whether major or minor, were subject to strict accountability. Students were expected to hand in their work on time, and assessments of performance could be traced directly to summative grades for the term. In some classes (e.g., Teacher 3, Teacher 5, and Teacher 6), however, it was observed that accountability was suspended or at least softened when students were working on more challenging tasks.

On a few occasions, teachers used bonus points to supplement grades for individual tasks and gave extra chances to complete tasks successfully. Teacher 3 (English), for instance, was dissatisfied with the grades for the first spelling unit of the 6-week term. After expressing her dissatisfaction to the students, the teacher prepared the students for a re-test by providing time to review the content of the unit and by conducting a tic-tac-toe game over words, definitions, and sentences. The winning team in the game received 5 bonus points that could be applied to their grade on their re-test. Grades on the

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second test were higher, in part because of bonus points, and the teacher was pleased with the class performance.

Bonus points were also used by most of the other teachers, but the relation of bonus points to grades for the term was not always clear. Bonus points were often not recorded or were attached to work that did not count very heavily in calculating the final term grade. It appears that bonus points were often used as an immediate inducement to encourage students to do a particular task, but the long-term consequence on grades was minimal, although this fact was not always made explicit to students. Situations in which bonus points appear are currently being examined to determine whether their use is associated with special types of academic work. In particular, were bonus points used to induce students to try academic work at higher levels of cognitive processing?

In classes taught by Teachers 2, 3, and 5 there was the general looseness of policies for grading daily work and practice exercises. Teacher 2 (English) seldom recorded grades for work done in class and Teacher 3 (English) did not grade review exercises done immediately before a test. In addition, Teacher 3 graded daily work only indirectly: Daily work was graded and grades were recorded, but they were not averaged for the term. Rather, a notebook test in which students were required to provide specific information about items on all assignments kept in their notebooks was substituted for an average of daily grades. This policy was not made explicit to students. The teacher told the observer that daily grades were given to make sure students did the work. Teacher 5 (math) did not grade any work on new material until the students had several weeks to practice with it.

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Again, this policy was not made explicit to students. Indeed, accountability in Teacher 5's class seemed to be based on her personal knowledge of each student's progress rather than explicitly on recorded grades. Students only occasionally received graded papers back, but the impression was given that all work was inspected by the teacher.

An examination of major grades, that is, grades that contributed most heavily to a term grade, indicated that they were typically, but not exclusively, attached to work that was familiar and routinized, such as spelling, journal writing, or warm-ups. In other words, a significant portion of term grades consisted of work that is readily accomplishable by nearly all of the students. In Teacher 3's English class, for instance, half of the term grade was based on the perfect paragraph, journals, and the notebook test. All three of these tasks were relatively low on risk. In Teacher 2's English class, considerable weight was given to spelling tests in calculating term grades. At one level, there seemed to be a presumption among the teachers that students could be expected to accomplish these tasks and therefore could be held accountable for the work. At another level, this policy for major grades works in conjunction with policies for bonus points and grading new work to create an economy of surplus credit in classrooms and a "fail-safe" cushion for academic work. In the language of the conceptual framework for the MAT study, teachers appear to suspend risk for academic work in a solution of surplus credit. Part of this effect occurs because all grades have to be reduced to a single grade at the end of the term. Along the way, some grades are lost or their effects are washed out. In addition, the surplus credit system enables the teacher to rapidly adjust the effects of risk on particular tasks,

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especially those for which performance is likely to be poor, without abandoning accountability altogether.

Curriculum as a lunar landscape. The picture emerging from the analysis of the junior high school data suggests that the curriculum can be defined as a lunar landscape consisting of a sequence of tasks each of which defines a gap students must cross by processing information on their own. These gaps are often quite narrow, such as those which can be crossed by using a two-step computational algorithm in mathematics or remembering the spelling of a list of words. Sometimes the gaps are wider, such as those involving composition, novel word problems, application of a science concept to an unfamiliar problem, or designing an experiment.

Progress through the curriculum is generally efficient when the gaps are small. When gaps are larger, students would seem to bunch up at the edge. That is, many of the students have a difficult time getting started with the assigned work. In addition, error rates increase and completion rates decrease. These conditions create workplace tensions in a classroom between the academic task system and the demands for pace and momentum inherent in the group management system (see Doyle, 1980, 1983; Kounin, 1970). Teachers often appear to respond to such tension by either redefining gaps to make them smaller or calling upon the surplus credit available in the situation to encourage students to take the risk of leaping over larger gaps.

These adjustments to the task system do not involve formal or even spoken negotiations between teachers and students or overt resistance to academic work. Rather, the effect seems to be a "natural" effect of the workplace forces in classrooms. In any case, it is reasonable to ask

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about the effects of this smoothing of the work system on the fundamental character of the academic work students accomplish.

Although preliminary, this metaphor has the advantage of clearly showing a possible way in which teacher, student, curriculum, and management variables intersect in classroom environments. In this respect, it is a useful tool for analyzing the management of academic tasks.

Anticipatory management of the curriculum. With the exception of Teacher 1 (science), the junior high school classes included in Spring data collection appeared to be designed for the efficient production of academic work. That is, task systems were constructed and managed in such a manner that a great deal of student work was accomplished with a high degree of work involvement from nearly all students. Observational records indicate that the classes were often organized around routinized work patterns, such as warm-ups in math classes and recurring journal writing segments and spelling assignments in English classes. In addition, work was typically defined quite explicitly and students were given a great deal of guided practice with problem types. Finally, the emphasis in processing content seemed to be on using algorithms rather than on higher level cognitive operations.

An examination of the tasks themselves indicates they were usually high in familiarity and low in assembly. That is, students seldom operated for very long in novel task environments and were seldom required to pull together information or processes in ways that had not been demonstrated to them in advance. Instruction was very step-like and gaps students had to fill with their own information processing were

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relatively small. As a result, they moved through the curriculum with reasonable ease and efficiency, and class sessions ran smoothly.

In one case, Teacher 6 (science), content development across the term did not seem to follow a clear logical progression. The teacher covered a large amount of content, but it appeared as though topics were scheduled on the basis of management considerations primarily, that is, on the basis of how work events fit into the timeframes of class meetings or how they appealed to students. From the perspective of the content, the sequence often appeared to be arbitrary. Yet, a large amount of work was completed and student engagement was high throughout the term. Moreover, there is no clear evidence that the students were bothered by the apparent lack of content progression or integration. There was a logic to the work system, that is, tasks were predictable and easy to accomplish, and the students seemed satisfied with this arrangement.

The contrast case of Teacher 1 (science) is instructive. In this class, substantially fewer tasks were accomplished, engagement was not always high, and work was not always conducted efficiently. Yet the logical progression of content was quite explicit and clear, and students were pushed to deal with some fundamental issues in science. Finally, the texture of the task system in this class was distinctive. In particular, the gaps students had to fill with their own information processing were typically larger than those in the other classes. Task environments were not always high on familiarity, and students were sometimes required to discern relationships, assemble information, and solve problems.

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The analysis of production systems raises the issue of whether knowledge and skills acquired in small-step task systems are woven to these task environments or coded flexibly enough to be usable in different situations. In other words, was knowledge coded episodically rather than semantically? Certainly most of the teachers appeared to work toward creating familiarity for task environments, and few opportunities were provided for students to make executive-level decisions with content or struggle with problems of expressing meaning. If episodic coding prevailed, then it could be argued that understanding was limited and success on other types of tasks (such as independent measures of achievement) would be expected only for tasks requiring parallel processing. Under such circumstances, modifying task environments to test the limits of what students know might result in production deficiencies, that is, students might not recognize that they can use what they know.

One interpretation of the production systems in the MAT classes is that the teachers anticipated possible difficulties associated with assembly tasks and sharpened and refined the work into steps that students could easily accomplish. In other words, they smoothed out possible workplace tension in advance. If this interpretation is accurate, then classroom management, by feeding back into planning decisions, has a substantial impact on curriculum (see Doyle, in press). That is, teachers are, in part, achieving order in classrooms by excluding academic work that might place strains on the management system (see Doyle, in press, for a discussion of this issue). If such is the case, then research into the management of academic tasks is central to the achievement of excellence in American education.

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In this regard, the analysis of production dimensions of the classes gives some insights into the components of classroom work systems. It is instructive to describe the large number of elements teachers appeared to hold in place to sustain work in the classes. In addition, establishing and sustaining higher order tasks would seem to require highly refined management skills to operate work systems effectively.

Conclusion

The study of academic tasks in junior high school classes, Phase I of the MAT, has generated rich insights into how teacher, student, curriculum, and management variables intersect in the construction of educative events in classrooms. This paper contains a summary of some of this knowledge and of the questions and methods that guided the analysis. Phase II of the study is focusing on high school English and science classes, and much work remains to be done. Phase I has been encouraging in its promise to increase our understanding of how classrooms work and what factors teachers need to consider in planning effective secondary teaching.

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Appendix A

Topic and Task Lists

for MAT Teachers

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MAT Teacher 1

Academic Tasks Accomplished from

2/9/83 to 3/3/83 (Scientific Methods Unit)

Major Tasks:

a. (Task 10) Experiment 1, using the scientific method: Does a gas have mass and weight? Ss do experiment and answer 11 questions.

Date due: 2/18/83 (But many turned it in earlier)

Sessions: 6 (2/10, 2/11, 2/14, 2/15, 2/16, 2/18, possibly 2/21)

Time: Overlap with Tasks 11 & 12. For Tasks 10-12 considered as a unit, total time was 298, or 22% of total observed task time.

b. (Task 11) Experiment 2, using the scientific method: Does an object weigh more or less in water than in air? Ss perform experiment and answer 1 question.

Date due: 2/18/83 (But some turned it in earlier)

Sessions: 6 (2/10, 2/11, 2/14, 2/15, 2/16, 2/18, possibly 2/21)

Time: Overlap with Tasks 10 & 12. For Tasks 10-12 considered as a unit, total time was 298, or 22% of total observed task time.

c. (Task 12) Experiment 3, using the scientific method: Is alcohol more or less dense than water?

Date handed in: 2/22/83 (Final extended due date was 2/23, but students had all in 2/22)

Sessions: 8 (2/10, 2/11, 2/14, 2/15, 2/16, 2/18, 2/21, 2/22)

Time: Overlap with Tasks 10 & 11. For Tasks 10-12 considered as a unit, total time was 298, or 22% of total observed task time.

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d. (Task 14) Test over the scientific method and experiments.

Date turned in: 3/3/83 (Originally scheduled for 3-1, moved to 3-2, Ss allowed to finish 3-3)

Sessions: 6 (Presenting and reviewing for test --4 sessions: 2/23, 2/24, 2/28, 3/1. Taking test--2 sessions: 3/2, 3/3)

Time: 216 minutes, or 16% of total observed task time.

e. Optional activities done mostly out of class by 12 of 25 Ss. Only about 12 minutes (less than 1%) of whole class task time was used to work on optional tasks, although at least 5 Ss worked on optional tasks in class for significant blocks of time.

Minor Tasks:

a. (Task 7) Read handout "Performing an Experiment" and fill in 6 steps of scientific method.

Date handed in: Checked in notebook 2/15/83

Sessions: Homework assignment, but discussed 2/9, 2/10; time also available 2/15

Time: Only 1 minute, officially. Discussion after 2/9 was content development for tasks 10-12, although Ss could have still worked on 7.

b. (Task 8) Rationale statements for each of the 6 steps of the scientific method.

Date handed in: 2/9/83

Sessions: 1 (2/9)

Time: 40 minutes, 3% total observed time.

c. (Task 9) Questions over the scientic method and concepts of mass and weight.

Date handed in: 2/14/83

Sessions: 1 (2/11 plus homework) (Eight students also worked on it in class 2/14)

Time: 5 minutes, less than 1% of total observed class time.

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d. (Task 13) Notebook grade

Date turned in: 2/15/83

Sessions: 3 (1/18, 2/14, 2/15)

Time: 11 minutes, less than 1% total observed task time, although some Ss worked in class 2/15, without official permission.

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MAT Teacher 1

Academic Tasks Accomplished from

1/18/83 to 2/8/83 (Measurement and Metrics Unit)

Major Tasks:

a. (Task 4) Lab assignment on metric system and measurement.

Date due: 2/4/83

Sessions: 8 (1/24, 1/26, 1/27, 1/28, 1/31, 2/1, 2/2, 2/3)

Time: 341 minutes, or 25% of total observed task time.

b. (Task 6) Test over metric system and measurement.

Date due: 2/8/83

Sessions: 3 (2/4, 2/7, & 2/8)

Time: 99 minutes, or 7% of total observed task time.

Minor Tasks:

a. (Task 1) Scientific measurement questions.

Date due: 1/28/83

Sessions: 2 (1/18, & 1/19)

Time: 72 minutes, or 5% of total observed class task time.

b. (Task 2) Notes on 3 movies on metric system.

Date due: Notes checked in notebook, 2/15/83.

Sessions: 1 (1/21)

Time: 49 minutes, or 3% of total observed task time.

c. (Task 3) Notes on movie on atomic power.

Date due: checked, if at all, in notebook, 2/15/83.

Sessions: 1 (1/25)

Time: 53 minutes, or 4% of total observed task time.

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d. (Task 5) Scientific measurement vocabulary puzzle.

Date due: 2/8/83

Sessions: 1 (2/4)

Time: 15 minutes, of 1% of total observed task time.

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1/17/83 (Monday)

1. Teacher lecture on blood and diffusion. (The teacher questioned the students for memory of information previously presented. Students took notes on the teacher presentation. The teacher gave several definitions orally and students were to write these down in their notes.)

*2. Students did and then exchanged and corrected dittoed Worksheet A: The circulatory System-The Blood.

1/18/83 (Tuesday)

*1. Students did diffusion lab experiment and wrote up lab reports: Lab #2.

*2. Students did and then exchanged and corrected dittoed worksheet B: The Circulatory System-The Heart.

1/19/83 (Wednesday)

1. Students took notes during nurse's lecture on blood types.

*2. Students did blood typing and centrifuging lab and wrote up lab reports: Lab #3.

1/20/83 (Thursday)

1. Teacher lecture on parts of circulatory system and blood flow. (Students required to take notes and label handouts as the teacher did this.)

2. The teacher reviewed lecture by calling students individually up to a heart diagram on the bulletin board and having them identify structures. (Public)

*3. Students began lab #4, The Circulatory System-Activity Sheet.

1/21/83 (Friday)

*1. Students finish lab #4, The Circulatory System-Activity Sheet.

1/24/83 (Monday)

*1. Students did Blood Pressure and Heart Sounds Lab #5 and wrote up lab reports.

*2. Students did and then exchanged and corrected dittoed worksheet C, The Circulatory System-Blood Vessels, and dittoed worksheet D, The Circulatory System-Blood Typing.

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*Tasks

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1/25/83 (Tuesday)

*1. Students finished Blood pressure and Heart Sounds Lab #5.

*2. Students did and then exchanged and corrected textbook assignment #1, Circulation. Focus On Life Science textbook.

*3. Students did circulation crossword puzzle.

1/26/83 (Wednesday)

*1. Students do Earthworm dissection Lab #6.

1/27/83 (Thursday)

No Class

1/28/83 (Friday)

*1. Students take an identification test on the circulatory system.

*2. Students work on science fair notebooks and the teacher has conferences with individual students concerning their science fair projects.

3. Students watch a film strip on the circulatory system.

1/31/83 (Monday)

*1. Students did Heart Beat Rate Lab #7

2. Students correct old papers.

3. Film strip on digestive system.

2/1/83 (Tuesday)

*1. Students work independently on their science fair notebooks and projects and the teacher has conferences with individual students concerning this task.

2/2/83 (Wednesday)

*1. Students took a circulatory system spelling test.

*2. Students did and then exchanged and corrected the textbook assignment #2, The Digestive System. Exploring Living Things textbook.

2/3/83 (Thursday)

1. Teacher lecture on the digestive system (students required to take notes.)

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2/4/83 (Friday)

*1. Students did Taste Lab #8 and wrote up lab reports.

2/7/83 (Monday)

1. Teacher lecture and review of the digestive system. (Students took notes and labeled a diagram during the teacher lecture and the teacher questioned students for memory of previous information presented - this was an oral questioning and only volunteers participated.)

*2. Students did and then exchanged and corrected dittoed worksheets A, B, C, and D on the digestive system.

2/8/83 (Tuesday)

*1. Students did and exchanged and corrected dittoed worksheets E & F on the digestive system.

*2. Students did and exchanged and corrected microfilm sets 50 and 93 on Animal Tissue and Ingestion.

3. Students began working on a spelling review sheet for the digestive system.

2/9/83 (Wednesday)

1. Students watched film-strip on the digestive system.

*2. Students did and then exchanged and corrected crossword puzzle on the digestive system and abbreviations.

2/10/83 (Thursday)

*1. Digestive Heat Lab #9

2/11/83 (Friday)

1. Students watched film on bacteria.

*2. Students did textbook assignment #3; Nutrition. Focus On Life Science textbook.

*3. Students gave the teacher science fair notebooks, one at a time, and the teacher quickly checked and wrote comments on these and then returned them to the students.

4. The teacher gave students progress reports after checking their science fair notebooks.

*5. Students began working on food graphs.

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2/14/83 (Monday)

*1. Students exchanged and corrected text assignemnt #3 on nutrition. (The teacher recorded grades as students called them out.)

*2. Students completed and handed in food graphs.

3. Students recorded science fair information onto judging sheets.

4. Teacher lecture on good health habits. (Students took notes.)

2/15/83 (Tuesday)

*1. Students did Lab #10, The Digestive System - Activity Sheet.

2/16/83 (Wednesday)

1. Teacher lecture on Health. (Students took notes.)

2/17/83 (Thursday)

1. Teacher lecture on nutrition. (Students took notes.)

2. The teacher reviewed movement of food through the digestive system and the digestive process (by questioning students) as she passed out treats.

*3. Students to write a description of movement of an apple through the digestive system.

*4. Students did Identification of Food groups and corresponding Minerals or Vitamins - dittoed workeheet.

2/18/83 (Friday)

*1. Students did and then exchanged and corrected textbook assignment #4, Drugs. Focus On Life Science textbook.

2/21/83 (Monday)

1. Students watched film about insects.

*2. Students set up science fair projects.

3. 3 students did a textbook assignment. (These students did not bring science fair projects to class as instructed.)

2/22/83 (Tuesday)

1. Students watched film about insects and then a Walt Disney film about the body and digestion.

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2/23/83 (Wednesday)

*1. Students did frog dissection: Lab #11

2/24/83 (Thursday)

*1. Students completed frog dissection; Lab #11

*2. Identification test on frog dissection.

3. The teacher lectured on Black history.

4. Class discussion concerning home remedies (Folklore).

2/25/83 (Friday)

*1. Students wrote up lab reports for the frog dissection: Lab #11

*2. Students took identification test on the digestive system.

3. Students looked over graded judging sheets for their science fair projects.

4. The teacher handed out certificates for science fair projects to students who did not win awards.

5. The teacher explained her grading procedure and told students who wished to know, their 6 weeks grade.

6. Students watched film on reptiles.

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1. The Circulatory System--The Blood; Dittoed Worksheet A — Minor task

   Handed in: 1/17/83

   Sessions 1: 1/17/83

   Time: 19 minutes

2. Diffusion Lab #2 — Minor task

   Handed in: 1/18/83

   Sessions 2: 1/17/83, 1/18/83

   Time: 47-65 minutes

3. The Circulatory System--The Heart; Dittoed Worksheet B — Minor task

   Handed in: 1/18/83

   Sessions 1: 1/18/83

   Time: 19 minutes

4. Blood Typing and Centrifuging Lab #3 — Minor task

   Handed in: 1/19/83

   Sessions 1: 1/19/83

   Time: 45 minutes

5. The Circulatory System--Activity Sheet; Lab #4 — Minor task

   Handed in: 1/21/83

   Sessions 2: 1/20/83, 1/21/83

   Time: 57 minutes

6. Blood Pressure and Heart Sounds Lab #5 — Minor task

   Handed in: 1/25/83

   Sessions 2: 1/24/83, 1/25/83

   Time: 18 minutes

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7. The Circulatory System--The Blood Vessels; Dittoed Worksheet C
   The Circulatory System--Blood Typing; Dittoed Worksheet D — Minor task
   Handed in: 1/24/83
   Sessions 1: 1/24/83
   Time: 23 minutes

8. Textbook Assigment #1, Circulation — Minor task
   Handed in: 1/25/83
   Sessions 1: 1/25/83
   Time: 34 minutes

9. Crossword Puzzle: Your Heart and How It Works — Minor task
   Handed in: 1/25/83-1/26/83
   Sessions 1: 1/25/83
   Time: 7-14 minutes

10. Earthworm Dissection Lab #6 — Minor task
    Handed in: 1/26/83
    Sessions 1: 1/26/83
    Time: 54 minutes

11. Circulatory System Identification Quiz — Minor task
    Handed in: 1/28/83
    Sessions 2: 1/28/83; 1/20/83
    Time: 1 hour, 10 minutes

12. Science Fair notebook and project — Major task
    Handed in: 2/21/83
    Sessions 6: 1/24, 1/28, 1/31, 2/1, 2/14, 2/21; while observer was present
    Time: 1 hour 54 minutes (while observer was present)

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13. Heart Beat Rate Lab #7 — Minor task

    Handed in: 1/31/83

    Sessions 1: 1/31/83

    Time: 21 minutes

14. Circulatory System Spelling Test — Minor task

    Handed in: 2/2/83

    Sessions 1: 2/2/83

    Time: 12 minutes

15. Textbook Assignment #2, Digestion — Minor task

    Handed in: 2/2/83

    Sessions 1: 2/2/83

    Time: 41 minutes

16. Taste Lab #8 — Minor task

    Handed in: 2/4/83

    Sessions 1: 2/4/83

    Time: 51 minutes

17. The Digestive System--Food; Dittoed Worksheet A — Minor task

    The Digestive System--The Mouth & Throat; Dittoed Worksheet B

    The Digestive System--The Esophagus & Stomach; Dittoed Worksheet C

    The Digestive System--The Liver & Pancreas; Dittoed Worksheet D

    Corrected, not handed in: 2/7/83

    Sessions 1: 2/7/83

    Time: 25 minutes

18. The Digestive System--The Small Intestine; Dittoed Worksheet E — Minor task

    The Digestive System--The Large Intestine; Dittoed Worksheet F

    Corrected, not handed in: 2/8/83

    Sessions 1: 2/8/83

    Time: 17 minutes

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19. Microfilm set 50; Animal Tissues — Minor task

    Microfilm set 93; Ingestion (Amoeba)

    Corrected, not handed in: 2/8/83

    Sessions 1: 2/8/83

    Time: 28-35 minutes

20. Crossword Puzzle: Miscellaneous — Minor task

    Handed in: 2/9/83

    Sessions 1: 2/9/83

    Time: 33 minutes

21. Digestive Heat Lab #9 — Minor task

    Handed in: 2/10/83

    Sessions 1: 2/10/83

    Time: 51 minutes

22. Textbook Assignment #3; Nutrition — Minor task

    Handed in: 2/14/83

    Sessions 2: 2/11/83, 2/14/83

    Time: 55 minutes

23. Food graphs — Minor task

    Handed in: 2/14/83

    Sessions 2: 2/11/83, 2/14/83

    Time: 35 minutes

24. The Digestive System--Activity Sheet; Lab #10 — Minor task

    Handed in: 2/15/83

    Sessions 1: 2/15/83

    Time: 52 minutes

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25. Written description of movement of apple through the digestive system and the digestive process. — Minor task (No grade given)

    Handed in: 2/17/83

    Sessions 1: 2/17/83

    Time: 13 minutes

26. Identification of Food Groups and Corresponding Minerals and Vitamins; A Worksheet — Minor task

    Handed in: 2/17/83

    Sessions 1: 2/17/83

    Time: 19 minutes

27. Textbook Assignment #4; Drugs — Minor task

    Handed in: 2/18/83

    Sessions 1: 2/18/83

    Time: 50 minutes

28. Frog Dissection; Lab #11 — Minor task

    Handed in: 2/25/83

    Sessions 3: 2/23/83, 2/24/83, 2/25/83

    Time: 1 hour and 16 minutes

29. Frog Structure Identification Quiz — Minor task

    Test taken on 2/24/83

    Sessions 2: 2/23/83, 2/24/83

    Time: 68 minutes

30. Digestive System Identification Quiz — Minor task

    Handed in: 2/25/83

    Sessions 2: 2/7/83, 2/25/83

    Time: 41 minutes

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Topic List for 1/17/83 - 2/25/83

Week #1

January 17, 1983 - (Monday)

1. Check writing segment of TABS test
2. Topic sentence recognition and corrections
3. Spelling words (Unit 16)
4. Sentence diagramming

Homework - Study for quiz on Confusing Word List #4 for Thursday

January 18, 1983 - (Tuesday)

1. Sentence diagramming (check them)
2. Check reading section of TABS test
3. Reasons and Examples Paragraphs; please pass out journals

Homework - Study for Spelling Pretest #16

January 19, 1983 - (Wednesday)

*1. Comma Rule #7
2. Spelling Pretest #16
3. Reasons and Examples Paragraph

Homework - Pretest homework and Confusing Words Quiz on Thursday

January 20, 1983 - (Thursday)

*1. Confusing Words Quiz #4
2. Adverbs, p. 242
3. Peer editing of first draft - Final draft due Monday

Homework - Study for Spelling Test #16

January 21, 1983 - (Friday)

1. Table of Contents - folder check next week
*2. Spelling Test Unit 16 - Have you turned in your pretest homework?

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3. Journal writing

Homework - Reasons and Examples Paragraph due Monday - 45 minute detention + 0 for anyone caught empty-handed

Week #2

January 24, 1983 - (Monday)

1. Copy Table of Contents for folder check
*2. Paragraphs - keep at desks until called for
3. Comma Rule #8
4. Comparison and Contrast Paragraph
5. Spelling Unit #19, p. 60

Homework - 1) Diagram sentences on side chalkboard, 2) Spelling p. 60, A1 and 2

January 25, 1983 - (Tuesday)

*1. Sentence diagramming - keep your homework
2. Comparison and Contrast Paragraph
3. Adjectives and Adverbs, p. 248 (never materializes)

Homework - 1) Spelling Pretest #19, 2) Folder check

January 26, 1983 - (Wednesday)

*1. Folder check
2. Spelling Pretest #19
3. Journal writing
4. Adjectives and Adverbs, p. 248 (never materializes)

Homework - Pretest homework - write each word you missed five times

January 27, 1983 - (Thursday)

1. "Capitalization and Punctuation for People Who Hate Capitalization and Punctuation."

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2. Adjectives and Adverbs?

Homework - Study for Spelling Test #19

January 28, 1983 - (Friday)

1. Adjective or Adverb?

*2. Spelling Test #19

3. Comma Rules

Homework - Test over all Comma Rules next Tuesday

Week #3

January 31, 1983 - (Monday)

1. Comparison and Contrast Paragraph

2. Capitalization Rules

*3. Spelling Unit #20, p. 63, A1 and 2

Homework - Comma Quiz tomorrow over all Comma Rules

February 1, 1983 - (Tuesday)

*1. Comma Quiz

2. Capitalization (never materializes)

3. Sentence diagramming, p. 398

Homework - 1) Finish sentence diagrams, 2) Spelling Pretest #20, 3) Bring picture of self as small child

February 2, 1983 - (Wednesday)

1. Capitalization

2. Spelling Pretest #20

3. Sentence diagramming

Homework - 1) Pretest homework, 2) Sentence diagramming, 3) Picture

February 3, 1983 - (Thursday)

*1. Sentence diagramming

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2. Journal writing

3. Pronouns, read pp. 182-3, do examples, p. 183 (never materializes)

Homework - 1) Spelling Test #20, 2) Final draft of poem with picture

February 4, 1983 - (Friday)

*1. Capitalization

*2. Spelling Test #20

3. "Changes"

No Homework

Week #4

February 7, 1983 - (Monday)

1. Pronouns, pp. 182 and 183

*2. "Changes"

*3. Spelling Unit #21

Homework - 1) Spelling, pp. 66 and 67, A1 and 2, and check the spelling, 2) Do you have any tests to make up?, 3) Signed Progress Reports due

February 8, 1983 - (Tuesday)

1. Pronouns

2. Comparison and Contrast Paragraph

3. "My Father and the Hippopatamus," p. 444

Homework - 1) Spelling Pretest #21, 2) Do you have any tests to make up?

February 9, 1983 - (Wednesday)

1. Spelling Pretest #21

2. "My Father and the Hippo."

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3. Comparison and Contrast Paragraph

Homework - Write each word you missed on your Pretest five times

February 10, 1983 - (Thursday)

*1. Pronouns: say, identify, replace

2. Comparison and Contrast Paragraph - YOU MUST HAVE YOUR OUTLINE TOMORROW

Homework - Spelling Test #21

February 11, 1983 - (Friday)

*1. Capitalization

*2. Spelling Test #21

3. Comparison and Contrast Paragraph (never materialized)

Homework - Rough draft due Monday

Week #5

February 14, 1983 - (Monday)

1. Capitalization

2. Test taking tips

3. Comparison and Contrast Paragraph

Homework - 1) Outline and rough draft due tomorrow, 2) Two sharpened #2 pencils, 3) Something to read

February 15, 1983 - (Tuesday)

1. My Father Lives in a Downtown Hotel

2. "Would a Lapidary Play Leapfrog in a Lyceum?"

3. Parts of Speech (review) (never materialized)

February 16, 1983 - (Wednesday)

1. My Dad Lives in a Downtown Hotel

2. "Would a Lapidary..." 1-10 due tomorrow

3. Capitalization (never materialized)

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February 17, 1983 - (Thursday)

1. My Dad Lives...

*2. Would a Lapidary..."

3. Capitalization (never materialized)

CAPITALIZATION QUIZ TOMORROW

February 18, 1983 - (Friday)

1. My Dad Lives...

2. Capitalization

3. Eight Parts of Speech Review (never materialized)

Week #6

February 21, 1983 - (Monday)

1. My Dad Lives...

*2. Capitalization

3. Spelling Unit #22

Homework - Spelling, p. 69, A1 and 2, p. 70, check the spelling and check the meaning

February 22, 1983 - (Tuesday)

1. My Dad Lives...

2. Write a reaction to the book

3. Eight Parts of Speech Review

Homework - Spelling Pretest #22

February 23, 1983 - (Wednesday)

1. Parts of Speech Review (due tomorrow)

2. Spelling Pretest #22 (Pretest homework due tomorrow)

3. Final Draft: Comparison/Contrast Paragraph (due Friday)

Homework - Pretest homework and Parts of Speech (if not completed in class)

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February 24, 1983 - (Thursday)

1. Parts of Speech Review
2. Epilogue

TURN IN PRETEST HOMEWORK, KEEP PARTS OF SPEECH REIVEW

Homework - 1) Final Draft of Comparison and Contrast Paragraph is due tomorrow, 2) Spelling Test #22 tomorrow

February 25, 1983 - (Friday)

1. Epilogue
2. Spelling Test #22
3. Sentence fragments

*Descriptions of these tasks prepared in detail

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Academic Tasks From 1/17/83-2/25/83

Major Tasks:

1. Spelling Tests

   Dates handed in: 1/21/83, 1/28/83, 2/4/83, 2/11/83

   Sessions: 12 (1/17, 1/19, 1/21, 1/24, 1/26, 1/28, 1/31, 2/2, 2/4, 2/7, 2/9, 2/11)

   Time: 150:45 (10%)

2. Reasons and Examples Paragraph

   Date handed in: 1/24/83

   Sessions: 3 (1/18, 1/19, 1/20)

   Time: 48:14 (3%)

3. "Changes" Writing Assignment

   Dates handed in: 2/4 and 2/7/83

   Sessions: 3 (2/3, 2/4, 2/7)

   Time: 63:44 (4%)

4. Comma Test

   Date handed in: 2/1/83

   Sessions: 4 (1/19, 1/24, 1/28, 2/1)

   Time: 25:39 (2%)

Minor Tasks:

5. Confusing Word Quiz #4

   Date handed in: 1/20/83

   Sessions: 1 (1/20)

   Time: 9:50 (1%)

6. Sentence Diagramming

   Date handed in: 1/25/83

   Sessions: 4 (1/17, 1/18, 1/24, 1/25)

   Time: 33:05 (2%)

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Minor Tasks (continued)

7. Sentence Diagramming

   Date handed in: 2/3/83

   Sessions: 7 (1/17, 1/18, 1/24, 1/25, 2/1, 2/2, 2/3)

   Time: 26:43 (2%)

8. Folder Check

   Date handed in: 1/26/83

   Sessions: 4 (1/19, 1/21, 1/24, 1/26) + several additional before observations

   Time: 45:54 (3%)

9. Spelling Unit 20

   Date handed in: 2/1/83

   Sessions: 1 (2/1)

   Time: 10:56 (1%)

10. Capitalization Quiz #1

    Date handed in: 2/11/83

    Sessions: 4 (1/31, 2/2, 2/4, 2/11)

    Time: 36:57 (2%)

11. Spelling Unit 21

    Date handed in: 2/8/83

    Sessions: 1 (2/7)

    Time: 16:00 (1%)

12. Pronoun Exercise

    Date handed in: 2/10/83

    Sessions: 3 (2/7, 2/8, 2/10)

    Time: 21:25 (1%)

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13. Capitalization Quiz #2

    Date handed in: 2/21/83

    Sessions: 7 (1/31, 2/2, 2/4, 2/11, 2/14, 2/18, 2/21)

    Time: 56:22 (4%)

14. Vocabulary Assignment

    Date handed in: 2/17/83

    Sessions: 3 (2/15, 2/16, 2/17)

    Time: 20:06 (1%)

15. Capitalization Exercise

    Date handed in: 2/4/83

    Sessions: 3 (1/31, 2/2, 2/4)

    Time: 18:33 (1%)

16. Comma Rule #7 Quiz

    Date handed in: 1/19/83

    Sessions: 1 (1/19)

    Time: 13:58 (1%)

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TOPIC LIST FOR MAT T3

JAN 17 (Monday)

1. Journal writing (8 1/2 minutes)
2. Discussion of notebooks (6 1/4 minutes)
*3. Pronoun exercises from LDU with spelling homework (39 minutes)

JAN 18 (Tuesday)

1. Journal writing (10 1/4 minutes)
2. Grading spelling exercises (11 minutes)
3. Pronoun exercises (31 minutes)

JAN 19 (Wednesday)

1. Journal writing (9 1/4 minutes)
2. Pronoun exercises (44 minutes)

JAN 20 (Thursday)

1. Journal writing (9 1/4 minutes)
2. Introduction to Perfect Paragraph (10 minutes)
*3. Pronoun test (25 minutes)

JAN 21 (Friday)

1. Journal writing (8 minutes)
2. Spelling test #1 (19 3/4 minutes)
3. Story reading, "To Serve Man" (20 3/4 minutes)
4. Questions on story (5 minutes)

JAN 24 (Monday)

1. Journal writing (9 minutes)
2. Comments on grading of Journals and on pronoun test results (2 1/4 minutes)
3. Comments on Spelling Test #1 results with review (31 1/2 minutes
4. Worksheet questions on "To Serve Man" (10 1/4 minutes)

JAN 25 (Tuesday)

1. Journal writing (8 minutes)
*2. Spelling test #1 [retest] (28 minutes)
3. Introduction to action and linking verbs (17 minutes)

JAN 26 (Wednesday)

*1. Journal writing [last entry for grade] (8 1/2 minutes)
*2. Worksheet questions on "To Serve Man" collected (no time)
3. Introduction to action and linking verbs (23 minutes)
4. Exercises on verbs (18 1/2 minutes)

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JAN 27 (Thursday)

1. Journal writing (8 3/4 minutes)
2. Checking verb exercises [no grade] (23 minutes)
3. Introduction to direct objects and subject complements (13 minutes)
4. Exercises on direct objects and subject complements (8 minutes)

JAN 28 (Friday)

1. Journal writing (8 3/4 minutes)
*2. Spelling test #2 (171/4 minutes)
3. Exercises on direct objects and subject complements (27 1/4 minutes)

JAN 31 (Monday)

1. Journal writing (8 1/2 minutes)
*2. Checking assignment on direct objects and subject complements (31 1/2 minutes)
3. Spelling exercises [for Test #3] (11 1/2 minutes)

FEB 1 (Tuesday)

1. Journal writing (8 1/2 minutes)
2. Correcting spelling homework (7 1/2 minutes)
3. Lesson on helping verbs (28 minutes)
4. Exercises on helping verbs (9 minutes)

FEB 2 (Wednesday)

1. Journal writing (9 1/2 minutes)
*2. Exercises on helping verbs collected (no time)
3. Comments on notebook test (1 1/2 minutes)
*4. Correcting Exercise 35 (12 3/4 minutes)
5. Lesson on pronouns as subjects and direct objects (21 minutes)
6. Pronoun exercises (4 1/2 minutes)

FEB 3 (Thursday)

1. Journal writing (9 1/4 minutes)
2. Checks pronoun exercises [no grade] (19 3/4 minutes)
3. Introductory exercises on verbs and pronoun usage (4 1/4 minutes)
*4. Quiz on verbs and direct objects (17 3/4 minutes)

FEB 4 (Friday)

1. Journal Writing (6 1/4 minutes)
*2. Collects exercises on verbs and pronoun usage (no time)
3. Introduction to verb packet (12 3/4 minutes)
*4. Spelling Text #3 (18 minutes)

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FEB 7 (Monday)

1. Journal writing (10 3/4 minutes)
2. Verb packet exercises [continued from Fri] (27 3/4 minutes)
*3. Checking verb chart (13 1/2 minutes)

FEB 8 (Tuesday)

1. Journal writing (8 1/2 minutes)
2. Checking spelling homework (8 minutes)
3. Review of verbs and introduction to irregular verbs (23 minutes)
4. Irregular verb chart, exercise I (11 1/2 minutes)

FEB 9 (Wednesday)

1. Journal writing (8 minutes)
*2. Checking Irregular Verb Chart I (29 minutes)
*3. Quiz on action and linking verbs, with verb chart and perfect paragraphs as back up (15 minutes)

FEB 10 (Thursday)

1. Journal writing (9 1/4 minutes)
2. Oral exercises on sentences in preparation for spelling test (115 33/4 minutes)
3. Oral exercises and board work on irregular verbs (3 3/4 minutes)
4. Irregular verb chart II (23 1/4 minutes)

FEB 11 (Friday)

1. Journal writing (8 3/4 minutes)
2. Introduction to irregular verb packet (5 minutes)
*3. Spelling Test #4 (20 1/2 minutes)
*4. Irregular verb chart II, with verb packet backup (12 1/4 minutes)

FEB 14 (Monday)

1. Journal writing (10 1/4 minutes)
2. Review of principal parts of verbs (7 1/2 minutes)
3. Verb packets with spelling homework (21 1/2 minutes)
*4. Correct verb packets (9 3/4 minutes)

FEB 15 (Tuesday) ITBS

FEB 16 (Wednesday) ITBS

FEB 17 (Thursday) ITBS

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FEB 18 (Friday)

1. Journal writing (8 1/4 minutes)
2. Checking spelling homework (6 1/2 minutes)
3. Spelling Bee (21 1/2 minutes)
*4. Quiz on verb charts (15 1/2 minutes)
*5. Collects Perfect Paragraphs for grades (no time)

FEB 21 (Monday)

1. Journal writing (9 1/4 minutes)
*2. 50 word spelling test (14 minutes)
*3. Usage worksheets with spelling homework (31 minutes)

FEB 22 (Tuesday)

1. Journal writing (8 1/2 minutes)
2. Checking spelling homework (4 1/4 minutes)
3. Exercises on verbs [review for test] (5 3/4 minutes)
4. Notebook test (30 1/4 minutes)

FEB 23 (Wednesday)

1. Journal writing (8 1/2 minutes)
*2. Notebook test extended (12 minutes)
3. Worksheets on verbs [no grade] (14 1/2 minutes)
4. Lesson on irregular verbs lie, lay, etc (18 minutes)

FEB 24 (Thursday)

1. Journal writing (8 minutes)
2. Review of verbs, etc. (16 1/4 minutes)
3. Spelling test [next 6 weeks] (17 minutes)
4. Exercises on usage and work on perfect paragraphs for next 6 weeks (9 minutes)

FEB 25 (Friday)

1. Journal writing (9 minutes)
2. Introduction to a writing assignment (3 minutes)
*3. Language test (41 1/4 minutes)

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TASK LIST FOR MAT T3

1. Pronoun exercise from LDU - 1/17
2. PRONOUN TEST - 1/20 (major task)
3. Spelling homework and test #1 - 1/25
4. JOURNALS - 1/26
5. Questions on story, "To Serve Man" - 1/26
6. Spelling homework and test #2 - 1/28
7. Exercises on direct objects and subject complements - 1/31
8. Exercises on helping verbs - 2/2
9. Exercise 35 on verbs - 2/2
10. Quiz on sentences with verbs & direct objects - 2/3
11. Exercises on verbs & pronoun usage - 2/4
12. Spelling homework and test #3 - 2/4
13. Verb chart - 2/7
14. Irregular verb chart I - 2/9
15. Quiz on action and linking verbs - 2/9
16. Spelling homework and test #4 - 2/11
17. Irregular verb chart II - 2/11
18. Verb packets - 2/14
19. Quiz on irregular verb chart - 2/18
20. PERFECT PARAGRAPH - 2/18
21. 50 WORD SPELLING TEST - 2/21
22. Verb usage worksheets - 2/21
23. NOTEBOOK TEST - 2/23
24. Language test - 2/25

Grades for the six weeks were based on six grades: (1) the Pronoun Test (1/20), (2) Journal Entries, (3) Perfect Paragraph, (4) the 50 Word Spelling Test, (5) the Notebook Test, and (6) an average of grades on the four spelling tests and the grade on the language test (2/25). All other minor tasks were graded and grades were recorded, but the grades were never actually used to calculate the final grade for the term. T3 used the Notebook Test grade as a substitute for an average of daily grades.

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Topic List for Class Sessions, Teacher 4, 1/19/83 - 2/25/83

1/19/83 (Wednesday)

1. Checking of Homework Assignment #5 (5 minutes)
2. Review of problems from Homework Assignment #5 (5 minutes)
3. Introduction to ratios and rates (19 minutes)
4. Test #1: Multiplication and division of decimals (20 minutes)
5. Seatwork, Assignment #6: Practice in writing simple ratios, problems 1-24, Mathematics for Mastery (approximately 5 minutes)

1/20/83 (Thursday)

1. Checking of Homework Assignment #6, including some discussion of problems on the assignment (10 minutes)
2. Introduction to procedures for finding equivalent ratios and checking for equivalence (36 minutes)

*3. Seatwork, Assignment #7: Finding equivalent ratios and checking for equivalents, Mathematics for Mastery, p. 156: 1-12, and p. 157: 1-15 (9 minutes)

1/21/83 (Friday) Substitute Teacher

*1. Warm Up #4: Writing equivalent ratios (5 minutes)

2. Checking Homework Assignment #7 (7 minutes)
3. Introduction to procedures for finding missing terms in a proportion (16 minutes)

*4. Seatwork, Assignment #8: Identifying equivalent ratios, finding missing terms, and writing proportions based on simple word problems. Mathematics for Mastery, p. 159: 1-28; p. 160: 1-9 (21 minutes)

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1/24/83 (Monday)

1. Presentation on writing proportions for word problems (8 minutes)

*2. Warm Up #5: Writing and solving proportions from word problems (12 minutes)

3. Discussion of writing and solving proportions from word problems (23 minutes)

*4. Seatwork: Homework Assignment #9 - Writing and solving proportions from word problems. Mathematics Around Us, p. 154: 1-5; Workbook, p. 39, 8 problems, 2 problems extra credit (20 minutes)

1/25/83 (Tuesday)

*1. Warm Up #6: Writing and solving proportions from word problems (12 minutes)

2. Presentation and discussion on converting word problems to proportions and solving (26 minutes)

3. Checking of Homework Assignments #8 and 9 (10 minutes)

*4. Seatwork: Homework Assignment #10 - Two worksheets, 8 problems on writing ratios, 10 problems requiring writing and solving proportions (15 minutes)

1/26/83 (Wednesday)

*1. Warm Up #7: Writing and solving proportions (11 minutes)

2. Checking and discussion of Homework Assignment #10 (24 minutes)

3. Presentation and discussion of using proportions to find unit prices (27 minutes)

*4. Homework Assignment #11: Unit price problems. Mathematics for Mastery, p. 163: 1-8 (no class time left for seatwork).

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1/27/83 (Thursday)

*1. Warm Up #8: Word problems with proportions (12 minutes)

2. Review of problems on Warm Up #8 (11 minutes)

3. Discussion of unit pricing (16 minutes)

4. Review of procedures for finding equivalent ratios and checking for equivalence (6 minutes)

*5. Seatwork: Homework Assignment #12 - Mathematics Around Us, p. 273: 1-7; Mathematics for Mastery, p. 167: 1-29, extra credit: 30-33. Seven unit price problems and a practice page of review problems on finding equivalent ratios, solving proportions, and word problems with proportions (15 minutes)

1/28/83 (Friday)

1. Checking of Homework Assignments #11 and 12 (17 minutes)

2. Introduction to writing ratios as percents and percents as ratios (23 minutes)

*3. Test over ratios, equivalence, solving proportions, and word problems with proportions.

*4. Homework Assignment #13: Writing ratios as percents and percents as ratios. Mathematics for Mastery, p. 169: 1-35 (no time in class)

1/31/83 (Monday)

*1. Warm Up #9: Five problems on percents and ratios (9 minutes)

2. Students check Homework Assignment #13

3. Content development on changing fractions to percents and solving number sentences for percents (35 minutes)

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*4. Seatwork: Homework Assignment #14 - Mathematics for Mastery, p. 176: 1-18. Solving number sentences for percents (16 minutes)

2/1/83 (Tuesday)

*1. Warm Up #10: Five problems on finding percents (13 minutes)

2. Checking Homework Assignment #14 (5 minutes)

3. Introduction to solving word problems with unknown percents (25 minutes)

*4. Seatwork: Homework Assignment #15 - a worksheet with 10 word problems with unknown percents (no class time)

2/2/83 (Wednesday)

*1. Warm Up #11: Five problems on percents (9 minutes)

2. Checking Homework Assignment #15 (5 minutes)

3. Review of homework problems (14 minutes)

*4. Seatwork: Homework Assignment #16 - Mathematics Around Us, p. 287: 1-15; p. 319: Set F, using proportions to find percents (30 minutes)

2/3/83 (Thursday)

1. Checking (6 minutes): Students check Assignment #16.

2. Content development (4 minutes): Teacher reviews and works problems from Homework Assignment #16.

3. Content development (13 minutes): Solving number sentences with the missing "part", given the percent and the whole, using proportions

*4. Unannounced test (about 20 minutes): Ten problems plus one bonus problem on solving number sentences and word problems.

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*5. Seatwork (approximately 20 minutes): Homework Assignment #17 - Mathematics for Mastery, p. 174: 1-20. Finding the percent of a number.

2/4/83 (Friday)

*1. Warm Up #12 (9 minutes): Five word problems on finding percents and parts.

2. Checking (6 minutes): Students check Homework Assignment #17.

3. Content development (24 minutes): Teacher reviews problems from Homework Assignment #17.

*4. Seatwork (27 minutes): Homework Assignment #18 - Mathematics Around Us, p. 319: 1-20, and Set E. More problems on finding percents and parts.

2/7/83 (Monday) Student teacher conducts this session

*1. Warm Up #13 (9 minutes): Five problems on finding percents and parts.

2. Checking (4 minutes): Students check Homework Assignment #18.

3. Seatwork (approximately 30 minutes): Thirty problems in the ITBS format with a multiple choice answer sheet - practice for the upcoming district-wide testing.

*4. Seatwork (approximately 20 minutes): Homework Assignment #19 - a 50 problem worksheet on percents.

2/8/83 (Tuesday)

*1. Warm Up #14 (16 minutes): Five word problems on percents and parts.

2. Checking (9 minutes): Students check Homework Assignment #19.

3. Content development (8 minutes): Review of problems on Warm Up #14 and a preview of the next homework assignment.

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*4. Seatwork (30 minutes): Homework Assignment #20 - setting up and solving proportions.

2/9/83 (Wednesday) Substitute teacher conducts this session

*1. Warm Up #15 (11 minutes): Five word problems involving percents.

2. Checking Homework Assignment #20 (3 minutes).

3. Content development (9 minutes): Review of Homework Assignment #20.

4. Content development (7 minutes): Presentation on using cross multiplication to solve proportion problems.

*5. Seatwork (32 minutes): Homework Assignment #21 - 20 mixed number sentence and word problems.

2/10/83 (Thursday)

*1. Warm Up #16 (11 minutes): Five word problems on finding percents and parts.

2. Checking (2 minutes): Students check Homework Assignment #21.

3. Content development (7 minutes): Review of problems on Homework Assignment #21.

4. Content development (10 minutes): Teacher introduces the third type of percent problem - determining the whole, given the percent and the part.

*5. Seatwork (31 minutes): Homework Assignment #22 - Mathematics Around Us, p. 289: 1-16; p. 319, Set G.

2/11/83 (Friday)

*1. Warm Up #17 (7 minutes): Five number sentence problems of the form: A percent of C is B, with C unknown.

2. Checking (3 minutes): Students check Homework Assignment #22.

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3. Content development (12 minutes): Review of problems on Homework Assignment #22.

4. Content development (19 minutes): Review of cues for setting up correct proportions in word problems.

*5. Seatwork (25 minutes): Homework Assignment #23 - Mathematics for Mastery, p. 175: 1-15. Finding the number when a percent of the number is known.

2/14/83 (Monday)

*1. Warm Up #18 (7 minutes): Five problems on finding a number when a percent of the number is known.

2. Checking (4 minutes): Students check Homework Assignment #23.

3. Teacher gives suggestions for taking the ITBS (6 minutes).

4. Teacher plays Math Tic Tac Toe with the class (38 minutes).

2/18/83 (Friday)

*1. Warm Up #19 (14 minutes): Word problems with percents, parts, or the whole unknown.

2. Teacher reviews class rules (21 minutes).

3. Content development (19 minutes): Setting up and solving word problems involving proportions.

*4. Seatwork (10 minutes): Homework Assignment #1 - two worksheets with word problems. Teacher checks notebooks during seatwork.

2/21/83 (Monday)

1. Discussion of notebook procedures and work requirements (15 minutes).

*2. Warm Up #1 (11 minutes): Mixed word problems.

3. Checking (5 minutes): Students check Homework Assignment #1.

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4. Content development (8 minutes): Review of problems on Homework Assignment #1.

5. Content development (18 minutes): Presentation on discount problems.

*6. Seatwork (7 minutes): Homework Assignment #2 - Mathematics for Mastery, p. 177: 1-9, and a worksheet on discount problems.

2/22/83 (Tuesday)

*1. Warm Up #2 (18 minutes): Five discount problems.

2. Checking (6 minutes): Students check Homework Assignment #2.

3. Content development (9 minutes): Review of problems on Homework Assignment #2.

4. Content development (7 minutes): Discount and sale price problems.

*5. Seatwork (28 minutes): Homework Assignment #3 - Mathematics Around Us, p. 285: 1-15; p. 287: 16-25. Sale price and discount problems.

2/23/83 (Wednesday)

*1. Warm Up #3 (11 minutes): Five discount problems.

2. Content development (43 minutes): Review of discount problems on Homework Assignment #3 and sales tax problems.

3. Organizing notebook folders for the next grading period (3 minutes).

*4. Seatwork (12 minutes): Students finish previous Homework Assignment #3 and begin Homework Assignment #4, Mathematics for Mastery, and a worksheet on sales price and discount problems.

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2/24/83 (Thursday)

*1. Warm Up Assignment #4 (11 minutes): Six problems on amount of tax, given a base and a tax rate.

2. Checking (12 minutes): Students check Homework Assignments #3 and 4.

3. Content development (8 minutes): Review of problems from Homework Assignment #4.

4. Content development (28 minutes): Interest rate problems.

*5. Seatwork (10 minutes): Homework Assignment #5 - Mathematics for Mastery, p. 178: 1-14. Interest problems.

2/25/83 (Friday)

1. Checking (5 minutes): Students check Homework Assignment #5.

2. Content development (17 minutes): Review of interest problems on Homework Assignment #5.

*3. Ten item test on discount, interest, and tax rates - unannounced (20 minutes).

*4. Seatwork (about 20 minutes): Homework Assignment #6 - two worksheets on percent, tax, and interest problems.

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Academic Tasks Accomplished from 1/19/83 to 1/28/83 in Teacher 4's Class

Major Tasks:

1. Test over ratios, proportions, and word problems with proportions.

   Date handed in: 1/28/83

   Sessions: 2 (1/27, 1/28)

   Time: 34 minutes

   Directly related to Minor Tasks 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, and 13

Minor Tasks:

2. Homework Assignment #6: Mathematics for Mastery, p. 155: 1-24. Practice in writing simple ratios.

   Date checked: 1/20/83

   Sessions: 2 (1/19, 1/20)

   Time: 34 minutes

3. Homework Assignment #7: Mathematics for Mastery, p. 156: 1-12, and p. 157: 1-15. Finding equivalent ratios and checking for equivalence.

   Date checked: 1/21/83

   Sessions: 2 (1/20, 1/21)

   Time: 52 minutes

4. Warm Up #4: Writing equivalent ratios - five problems.

   Date handed in: 1/21/83

   Sessions: 1 (1/21)

   Time: 5 minutes

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5. Homework Assignment #8: Mathematics for Mastery, p. 159: 1-28, and p. 160: 1-9. Identifying equivalent ratios, finding missing terms, and writing proportions based on simple word problems.

   Date checked: 1/25/83

   Sessions: 3 (1/21, 1/24, 1/25)

   Time: 40 minutes

6. Warm Up #5: Five word problems with proportions

   Date handed in: 1/24/83

   Sessions: 1 (1/24)

   Time: 20 minutes

7. Homework Assignment #9: Mathematics Around Us, p. 54: 1-5; Workbook, p. 39: 8 problems, 2 problems extra credit. Writing and solving proportions with word problems.

   Date checked: 1/25/83

   Sessions: 2 (1/24, 1/25)

   Time: 50 minutes

8. Warm Up #6: " g and solving proportions - five problems.

   Date handed in: 1/25/83

   Sessions: 1 (1/25)

   Time: 12 minutes

9. Homework Assignment #10: Eighteen problems on two worksheets, writing and solving proportions.

   Date checked: 1/26/83

   Sessions: 2 (1/25, 1/26)

   Time: 65 minutes

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10. Warm Up #7: Writing and solving proportions - five problems.

    Date handed in: 1/26/83

    Sessions: 1 (1/26)

    Time: 11 minutes

11. Homework Assignment #11: Mathematics for Mastery, p. 163: 1-8. Unit price problems.

    Date checked: 1/28/83

    Sessions: 3 (1/26, 1/27, 1/28)

    Time: 35 minutes

12. Warm Up #8: Solving word problems with proportions - five problems.

    Date handed in: 1/27/83

    Sessions: 1 (1/27)

    Time: 23 minutes

13. Homework Assignment #12: Mathematics Around Us, p. 273: 1-7; Mathematics for Mastery, p. 167: 1-29, extra credit 30-33. Seven unit price problems and a practice page reviewing finding equivalent ratios, solving proportions and word problems with proportions.

    Date checked: 1/27/83

    Sessions: 2 (1/26, 1/27)

    Time: 44 minutes

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Academic Tasks Accomplished from 1/28/83 to 2/3/83 in Teacher 4's Class

Major Tasks:

14. Unannounced test on finding percents.

    Date handed in: 2/3/83 (six absent students took the exam on 2/8/83)

    Sessions: 1 (2/3/83)

    Time: 20 minutes (approximate)

    Directly related minor tasks: 5 (#15, 16, 17, 18, 19, 20, and 21)

Minor Tasks:

15. Homework Assignment #13: Mathematics for Mastery, p. 169: 1-35. Problems on writing ratios as percents and percents as ratios.

    Date checked: 1/31/83

    Sessions: 2 (1/28, 1/31)

    Time: 29 minutes

16. Warm Up #9: Writing ratios as percents and percents as ratios --five problems.

    Date handed in: 1/31/83

    Sessions: 1 (1/31)

    Time: 9 minutes

17. Homework Assignment #14: Mathematics for Mastery, p. 176: 1-18. Finding what percent one number is of another.

    Date checked: 2/1/83

    Sessions: 2 (1/31, 2/1)

    Time: 56 minutes

18. Warm Up #10: Finding what percent one number is of another - five problems.

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Date handed in: 2/1/83

Sessions: 1 (2/1)

Time: 13 minutes

19. Homework Assignment #15: A worksheet with 10 word problems involving finding percents.

Date checked: 2/2/83

Sessions: 2 (2/1, 2/2)

Time: 30 minutes

20. Warm Up #11: Five word problems on finding percents.

Date handed in: 2/2/83

Sessions: 1 (2/2)

Time: 9 minutes

21. Homework Assignment #16: Mathematics Around Us, p. 287: 1-15; p. 319: Set F. Finding percents in number sentences.

Date checked: 2/3/83

Sessions: 2 (2/2, 2/3)

Time: 54 minutes

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Academic Tasks Accomplished from 2/3/82 to 3/1/83

Major Tasks:

48. Test over discount, interest, and sales tax.

    Date handed in: 2/25/83

    Sessions: 1 (2/25)

    Time: approx. 20 minutes

50. Test over ratios, proportions, and word problems with various applications of proportions.

    Date handed in: 3/1/83 (a few Ss finished the test after school)

    Sessions: 1 (3/1/83)

    Time: approx. 50 minutes

Minor Tasks:

23: Homework assignment #17: Mathematics for Mastery, page 174, 1-20. Finding the percent of a number using proportions.

    Date checked: 2/4/83

    Sessions: 2 (2/3 & 2/4)

    Time: approx. 39 minutes

24: Warm-up #12: 5 word problems, mixed percent and part.

    Date completed: 2/4/83

    Time: 9 minutes

25. Homework assignment #18. Mathematics Around Us, page 319, 1-20 and Set E (15 problems). Finding percents and parts using proportions.

    Time: 55 minutes

26. Warm-up #13: 5 problems finding percents.

    Date handed in: 2/7

    Sessions: 1 (2/7)

    Time: 9 minutes

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27. Homework assignment #19: A worksheet with 50 problems, mostly involving number sentences with a missing percent.

    Date checked: 2/8

    Sessions: 2 (2/7 & 2/8)

    Time: 29 minutes

28. Warm-up #14: 5 word problems, mixed percent and part.

    Date handed in: 2/8/83

    Sessions: 1 (2/8)

    Time: 16 minutes

29. Homework assignment #20: Workbook problems, setting up and solving proportions.

    Date checked: 2/9/83

    Sessions: 2 (2/8 & 2/9)

    Time: 50 minutes

30. Warm-up #15: 5 word problems involving percent.

    Date handed in: 2/9/83

    Sessions: 1 (2/9)

    Time: 11 minutes

31. Homework assignment #21: Worksheet, 20 mixed number sentence and word problems using proportions with percents and missing parts.

    Date checked: 2/10/83

    Sessions: 2 (2/9 & 2/10)

    Time: 48 minutes

32. Warm-up #16: 5 problems, number sentence and word problems with missing parts or percents.

    Date handed in: 2/10

    Sessions: 1 (2/10)

    Time: 11 minutes

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33. Homework assignment #22: Mathematics Around Us, page 289, 1-16; page 319 Set G. Finding a number when a percent of the number is known.

    Date checked: 2/11/83

    Sessions: 2 (2/10 & 2/11)

    Time: 56 minutes

34. Warm-up #17: 5 problems of the form A% of C is B with C unknown.

    Date handed in: 2/11/83

    Sessions: 1 (2/11)

    Time: 7 minutes

35. Homework assignment #23: Mathematics for Mastery, page 75, 1-15. Finding the number when a percent of the number is known.

    Date checked: 2/14/83

    Sessions: 2 (2/11 & 2/14)

    Time: 48 minutes

36. Warm-up #18: 5 problems on finding a number when the percent of the number is known.

    Date handed in: 2/14/83

    Sessions: 1 (2/14)

    Time: 7 minutes

37. Warm-up #19: 5 word problems, mixed type (find the part, find the whole, find the percent).

    Date handed in: 2/18/83

    Sessions: 1 (2/18)

    Time: 14 minutes

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38. Homework assignment #1: [Note: New 6-weeks recording period]
2 worksheets with word problems, mixed types.

Date checked: 2/21/83

Sessions: 2 (2/18 & 2/21)

Time: 43 minutes

39. Student notebooks.

Dates checked: 2/18 & 2/25/83

Sessions: Students use these every day

Time: approx. 30 minutes throughout all observations

40. Warm-up #1: [Note: Beginning of new 6-weeks grading period]
, and whole missing

41. Homework assignment #2: Mathematics for Mastery, page 177, 1-9
and a worksheet. Discount problems.

Date checked: 2/22/83

Sessions: 2 (2/21 & 2/22)

Time: 40 minutes

42. Warm-up #2: 5 discount problems.

Date handed in: 2/22/83

Sessions: 1 (2/22)

Time: 18 minutes

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43. Homework assignment #3: Mathematics Around Us, page 285, 1-15, page 287, 1-25. Sale price and discount problems.

    Date checked: 2/24'83

    Sessions: 3 (2/22, 2/23, & 2/24)

    Time: Approx. 61 minutes

44. Warm-up #3: 5 discount problems.

    Date handed in: 2/23/83

    Sessions: 1 (2/23)

    Time: 11 minutes

45. Homework assignment #4: Mathematics for Mastery and a worksheet on sales tax problems.

    Date checked: 2/24/83

    Sessions: 2 (2/23 & 2/24)

    Time: Approx. 49 minutes

46. Warm-up assignment #4: 6 problems on sales tax.

    Date handed in: 2/24/83

    Sessions: 1 (2/24)

    Time: 11 minutes

47. Homework assignment #5: Mathematics for Mastery, page 178, 1-14. Computing interest from principal, rate, and time.

    Date checked: 2/25/83

    Sessions: 2 (2/24 & 2/25)

    Time: 60 minutes

49. Homework assignment #6: 2 worksheets with interest problems.

    Date checked: 2/28/83

    Sessions: 2 (2/25 & 2/28)

    Time: Approx. 40 minutes

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Topic List for Class Sessions of Teacher 05, School 04, Period 02, Grade 7, Mathematics -- 1/17/83 to 2/25/83

1/17/83 (Monday) Substitute teacher

1. Warm-ups. 10 problems involving adding, subtracting, and multiplying fractions and decimals and prime factors.
   Time: 14 minutes

2. Skill Check. Problems on page 65 of the blue Spectrum work book.
   Time: 41 minutes

3. Classwork. Problems on pages 28-29 of the blue Spectrum work book.
   Time: 41 minutes (overlaps with Skill Check)

1/18/83 (Tuesday)

1. Warm-ups. 20 problems involving fractions (all operations), decimals (dividing and multiplying), LCM, exponents, and rounding off. (Checked in class, corrected, and taken home to study.)
   Time: 18 minutes
   Checking time: 5 minutes

2. Presentation. Changing fractions to decimals (students took notes).
   Time: 9 minutes

3. Skill Check. 10 problems involving changing fractions to decimals.
   Time: 15 minutes (includes checking)

4. Homework. 5 problems on textbook page 425 involving adding fractions with unlike denominators. (To do when finished with Skill Check.)
   Time: 5 minutes (overlaps with Skill Check time)

*5. Test. 5 problems involving changing fractions to decimals.
   Time: 4 minutes

1/19/83 (Wednesday)

1. Warm-ups. 10 problems involving adding and multiplying fractions, most having unlike denominators.
   Time: 14 minutes
   Checking time: 5 1/2 minutes

2. Skill Check. 10 problems involving changing fractions to decimals.
   Time: 13 minutes (includes checking)

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3. Feedback on yesterday's test. Done individually while students were working on Skill Check.

4. Presentation. Changing decimals to fractions (students took notes).
   Time: 6 minutes

5. Classwork. 20 problems involving changing decimals to fractions (first 7 done together as a class).
   Time: 11 minutes (includes checking)

1/20/83 (Thursday)

*1. Warm-ups. 10 problems involving fractions (all operations).
   Time: 21 minutes
   Checking time: 1 1/2 minutes

2. Skill Check. 10 problems changing decimals to fractions and fractions to decimals.
   Time: 8 1/2 minutes (Overlaps with last minutes of Warm-ups. Additional time was available during video tape.)

3. Classwork. Video tape on percent. Students were supposed to write 5 things from the show.
   Time: 30 minutes

1/21/83 (Friday)

*1. Warm-ups. 20 problems involving fractions and decimals (all operations), exponents, numbers with unlike signs.
   Time: 17 minutes
   Checking time: 7 minutes

2. Presentation. Changing decimals and fractions to percent.
   Time: 7 minutes

3. Skill Check I. 5 problems involving changing decimals to percent.

   Skill Check II. 5 problems involving changing fractions to percent (with 100 in denominator).

   Skill Check III. 5 problems involving changing fractions to percent.
   Time: 11 minutes (includes 4 minutes checking)

4. Presentation. Changing fractions to decimals, then percent.
   Time: 4 1/2 minutes

5. Skill Check IV. 3 problems involving changing fractions to percent.
   Time: 3 minutes (includes 1 minute checking)

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1/24/83 (Monday)

1. Warm-ups. 21 problems, 10 involving decimals and fractions (all operations) and 11 involving changing fractions to decimals and changing decimals to fractions. For a subset of students, 10 problems involving LCM were done instead of the 21 problems.
Time: 27 minutes

2. Skill Check. 18 problems on a puzzle involving changing fractions to decimals.
Time: 19 1/2 minutes (overlaps with last minutes of Warm-ups)

3. Presentation. Subtracting fractions with unlike denominators (students took notes).
Time: 3 minutes.

4. Classwork. 18 problems on textbook page 125 involving subtraction of fractions with unlike denominators.
Time: 17 minutes

1/25/83 (Tuesday)

*1. Warm-ups. 20 problems involving fractions and decimals (all operations). 7 problems on prime factors and reducing fractions were done by a subset of students instead of the 20 problems.
Time: 18 1/2 minutes
Checking time: 7 1/2 minutes

2. Discussion/Recitation. Changing fractions to decimals, decimals to fractions, and both to percent.
Time: 9 minutes

3. Skill Check. 12 problems involving interchanging between decimals, fractions, and percent.
Time: 13 minutes (checked as they went along)

4. Classwork. 10 problems involving interchanging between fractions, decimals, and percent.
Time: 3 minutes (includes checking by students who got finished)

1/26/83 (Wednesday)

*1. Warm-ups. 15 problems involving fractions.
Time: 22 minutes

2. Classwork. Ditto sheet containing problems involving interchanging between fractions, decimals, and percent.
Time: 43 minutes (first 11 minutes overlap end of warm-ups)

3. Skill Check. Dittoed puzzle involving changing fractions to percent in order to solve puzzle. (If turned in today, student receives a bonus.)
Time: 20 minutes (overlaps end of Classwork)

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1/27/83 (Thursday) Substitute teacher

*1. Warm-ups. 10 problems involving multiplying and adding fractions and decimals, subtracting decimals and prime factors.
Time: 10 minutes
Checking Time: 7 minutes

2. Skill Check. 29 problems on textbook page 163 involving multiplying fractions.
Time: 34 1/2 minutes.

3. Classwork. 30 problems on textbook page 120 involving adding fractions like denominators. (Homework if not finished.) Time: 34 1/2 minutes (same as for Skill Check)

1/28/83 (Friday)

*1. Warm-ups. 20 problems involving fractions and decimals (all operations).
Time: 23 minutes
Checking time: 5 minutes

2. Skill Check. 15 problems on textbook page 55 involving finding the value of an expression. (If all problems finished in class, student receives a bonus.)
Time: 10 minutes (overlaps with last minutes of Warm-ups)
Checking time: 7 minutes

3. Presentation. Explanation of a formula for changing percent to fractions or decimals in order to be able to solve equations for the percent, the part, or the whole. (Students took notes.)
Time: 15 minutes

1/31/83 (Monday)

*1. Warm-ups. 20 problems involving fractions and decimals (all operations), exponents, changing fractions to decimals, and changing decimals to fractions.
Time: 15 1/2 minutes
Checking time: 5 minutes

2. Presentation/Recitation. Working problems with percent by changing percent to decimals or fractions.
Time: 19 minutes

3. Classwork. Copy the rule for changing percent to fraction 10 times and work 12 problems using the rule.
Time: 13 minutes (includes checking)

2/1/83 (Tuesday)

*1. Warm-ups. 20 problems, 10 involving fractions and decimals (all operations) and 10 requiring conversion of percent to fractions.
Time: 18 1/2 minutes
Checking time: 7 minutes (included some explanation)

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2. Skill Check. 6 problems on textbook page 427 involving division of mixed numbers.
   Time: 12 minutes (includes last 10 minutes of warm-ups time and 2 minutes checking)

3. Presentation. Changing percent to decimals (students took notes).
   Time: 6 1/2 minutes (includes some recitation)

4. Classwork. 14 problems involving changing percent to decimals. Students worked each problem then the teacher discussed how to do it.
   Time: 13 minutes (includes checking)

5. Classwork. Copy the rule for changing percent to decimals 5 times. Bonus points given for every time written over 5 times.
   Time: 5 minutes.

2/2/83 (Wednesday)

1. Warm-ups. 20 problems involving interchanging between fractions decimals and percent.
   Time: 50 minutes
   Checking time: 5 minutes

2. Classwork. Dittoed puzzles involving division of mixed numbers, fractions and/or decimals. Bonus points received for completing first puzzle.
   Time: 50 minutes (overlaps with Warm-ups)

2/3/83 (Thursday)

1. Warm-ups. 20 problems involving changing percent to fractions, fractions to decimals, and fractions (all operations).
   Time: 28 minutes
   Checking time: 7 1/2 minutes

2. Skill Check. 23 problems on textbook page 379 involving multiplying negative numbers.
   Time: 37 1/2 minutes (overlaps with Warm-ups and includes checking)

3. Presentation/Recitation. Changing percent to fractions and decimals. (Students took notes.)
   Time: 17 1/2 minutes

2/4/83 (Friday)

*1. Warm-ups. 10 problems involving fractions and decimals (all operations)
   Time: 7 minutes

2. Classwork. Math bingo called TGIF. Students worked 27 problems involving fractions and decimals (all operations), exponents,

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LCM, interchanging between fractions, decimals, and percent.
Persons who had 5 in a row received candy.
Time: 47 1/2 minutes

2/7/83 (Monday)

1. Video tape on doing one's best.
   Time: 33 minutes

2. Thought page. Answer 6 questions related to content of the video tape.
   Time: 15 minutes

3. Discussion of the 6th question about the video tape and why the teacher thought the tape was important to see.
   Time: 2 1/2 minutes (overlaps last minutes of thought page)

*4. Warm-ups. 20 problems involving fractions and decimals (all operations) and interchanging between fractions, decimals, and percent. (Only first 10 problems were graded.)
   Time: 7 minutes

2/8/83 (Tuesday)

1. Warm-ups. 14 problems involving fractions and decimals (all operations) and prime factors.
   Time: 11 1/2 minutes
   Checking time: 5 minutes

2. Skill Check. Timed practice on 12 problems from a test booklet involving multiplying fractions and mixed numbers.
   Time: 13 1/2 minutes (includes checking)

3. "Test". Timed practice on 15 problems from a test booklet involving multiplying fractions and mixed numbers.
   Time: 14 minutes (includes checking)

4. Presentation. Figuring parts of a whole, knowing what operation to use, and knowing that percent must be changed to a decimal or fraction before working. (Students took notes.)
   Time: 8 minutes

2/9/83 (Wednesday)

1. Warm-ups. 20 problems involving fractions and decimals (all operations), changing percent to fractions, decimals, and prime factors.
   Time: 22 minutes
   Checking time: 5 minutes

2. Bonus problems. 10 problems on textbook page 170 involving division of mixed numbers.
   Time: 31 1/2 minutes (includes time for warm-ups and checking)

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3. Presentation/Recitation. Review of changing percent to fractions and decimals and using wheel. (Students took notes)
   Time: 17 minutes

4. Skill Check. 9 problems on textbook page 38 involving dividing fractions.
   Time: 6 1/2 minutes

2/10/83 (Thursday)

1. Warm-ups. 20 problems involving fractions and decimals (all operations), prime factors, and changing percent to fractions.
   Time: 31 minutes
   Checking time: 5 minutes

2. Bonus problems. 10 problems on textbook page 428 involving dividing decimals.
   Time: 27 1/2 minutes (includes end of warm-ups and checking)

3. Skill Check. 15 problems from a test booklet involving adding and subtracting fractions. Several students did a different page involving multiplication of fractions.
   Time: 15 minutes (includes checking of first 9 problems)

2/11/83 (Friday)

1. Warm-ups. 20 problems involving fractions and decimals (all operations), and changing percent to fractions and decimals.
   Time: 24 minutes
   Checking time: 4 minutes

2. Bonus problems. Problems on textbook page 425 involving adding and subtracting fractions.
   Time: 20 minutes (includes end of Warm-ups and checking)

3. Presentation. Review of changing percent to decimals or fractions.
   Time: 5 1/2 minutes

4. Skill Check. 5 problems involving changing percent to decimal or fractions using the wheel.
   Time: 17 minutes (includes discussing and checking)

2/14/83 (Monday)

1. Test. 42 problems involving fractions and decimals (all operations), LCM, exponents, rounding off numbers, and finding averages.
   Time: 55 minutes

2. Bonus problems. 16 problems on textbook page 194 involving decimals and rounding off.
   Time: 11 minutes (overlaps end of test)

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2/15/83 (Tuesday)

1. Exercise. 7 problems involving fractions (all operations). Not handed in.
   Time: 6 minutes (includes checking and discussion)

2. Presentation/Recitation. Review of changing percent to decimals or fractions.
   Time: 8 1/2 minutes

3. Presentation/Recitation. Formulas to find area and perimeter of rectangles and triangles.
   Time: 10 minutes

2/16/83 (Wednesday) Substitute teacher

1. Warm-ups. 20 problems involving fractions and decimals (adding, subtracting, and mulitplying) and prime factors.
   Time: 18 minutes

2. Classwork. 25 problems from textbook page 425 involving adding and subtracting fractions.
   Time: 18 minutes (same time allotted for Warm-ups)

2/17/83 (Thursday) No class due to ITBS testing

2/18/83 (Friday)

1. Presentation/Recitation. Finding part of the whole, working percent problems with the wheel. Interchanging between percent, fractions, and decimals. (Students took notes.)
   Time: 4 minutes

2. Skill Check. 5 problems using the wheel to find part of the whole involving multiplication after changing percent to fractions and decimals.
   Time: 15 minutes (includes checking)

3. Presentation. Finding what percent of the whole the part is, using the wheel. (Students took notes.)
   Time: 6 1/2 minutes

4. Skill Check. 4 problems using the wheel to find percent.
   Time: 8 minutes (includes checking)

5. Classwork. 4 additional problems using the wheel.
   Time: 8 minutes (includes checking)

6. Classwork. 40 problems on textbook pages 372 and 379 involving adding and multiplying negative numbers.
   Time: 11 minutes

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2/21/83 (Monday)

1. Warm-ups. 10 problems involving adding and multiplying fractions.
   Time: 11 1/2 minutes
   Checking time: 4 minutes

2. Skill Check I. 5 wheel problems looking for the top number.
   Time: 22 minutes

3. Skill Check II. 5 wheel problems looking for the percent.
   Time: 13 minutes

4. Classwork. 90 problems on textbook page 427 involving multiplying and dividing fractions. Students were told to work on these problems when they finish their Skill Checks.
   Time: 38 minutes (introduction -- 3 minutes prior to Skill Check I; overlaps with Skill Check times)

2/22/83 (Tuesday)

1. Warm-ups. 10 problems involving subtracting and dividing fractions and mixed numbers.
   Time: 15 minutes
   Checking time: 4 minutes

2. Skill Check. Contest in which students from two teams (boys versus girls) competed to complete 18 wheel problems correctly and quickly. Those students not at the board during the contest were to do the problems on their own paper. All problems were the wheel type but required working for the different parts.
   Time: 35 minutes (includes discussion and checking)

2/23/83 (Wednesday)

*1. Test. 20 problems involving fractions and decimals (all operations) and 5 for a bonus using wheel problems.
   Time: 44 minutes

2. Classwork. 16 problems on textbook page 202 involving fractions (all operations)
   Time: 44 minutes (overlaps with test time)

3. Skill Check. 10 problems on textbook page 426 involving adding and subtracting decimals.
   Time: 10 minutes

2/24/83 (Thursday)

1. Warm-ups. 15 problems involving subtracting fractions, adding and multiplying decimals in the same problems, and wheel problems.
   Time: 35 minutes
   Checking time: 6 1/2 minutes

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2. Bonus problems. 22 problems on textbook page 126 involving adding mixed numbers.
   Time: 28 1/2 minutes (includes end of Warm-ups and checking)

3. Skill Check. 4 wheel problems looking for the large number, and requiring conversion of percent to decimals.
   Time: 12 1/2 minutes (includes checking)

2/25/83 (Friday)

1. Warm-ups. 10 problems involving fractions and decimals (adding, subtracting, and multiplying)
   Time: 55 minutes

2. Classwork. 24 wheel problems requiring students to interchange between fractions, decimals, and percent in solving for the missing part of the problem.
   Time: 52 1/2 minutes (overlaps with end of Warm-ups)

3. Bonus problems. 12 problems on textbook page 122 involving adding mixed numbers.
   Time: 17 minutes (overlaps with end of Warm-ups and classwork time)

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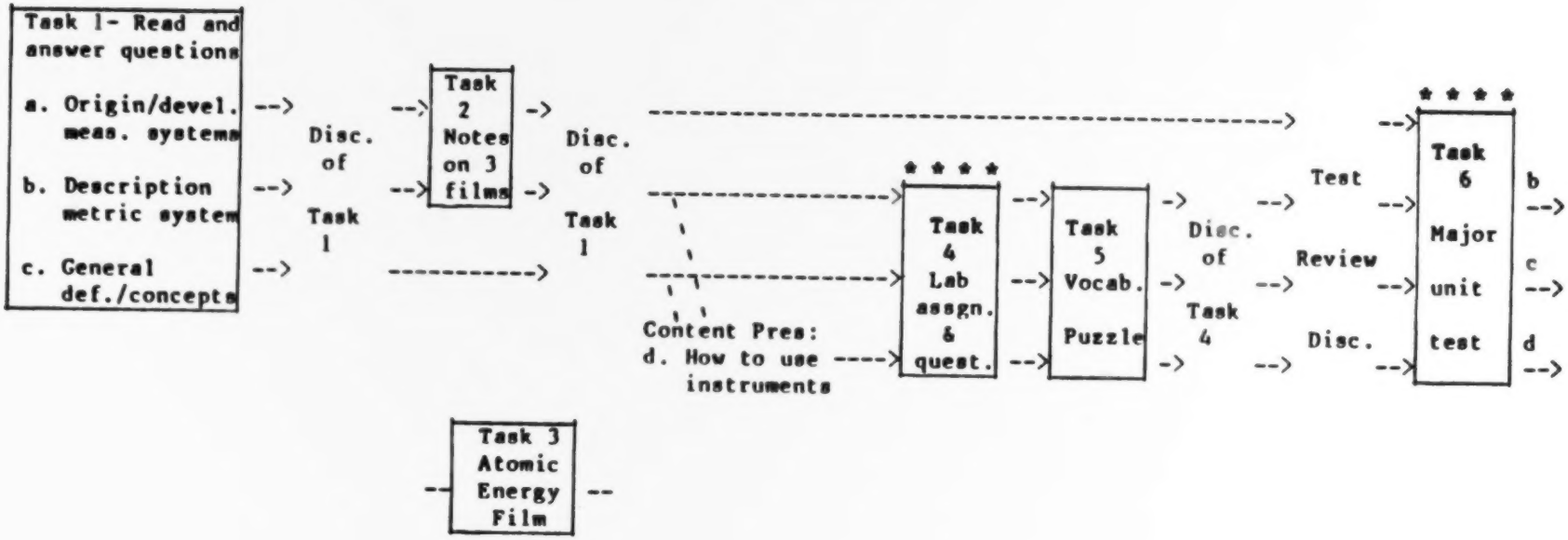
Appendix B

Content Strands for MAT Teachers

Figure 1

Flow Chart of Tasks and Content in Measurement and Metrics Unit

MAT Teacher 1, 1/18 to 2/8



Content Strands a, b, c, d:
see content strands list

Optional tasks related:

B1--to Tasks 1 & 2, weakly

B2--to Tasks 1, 2, 6 directly; 5 indirectly

B3--to Tasks 1 & 2, weakly

A2--to Tasks 1, 2, & 6

------- direct relationship

- - - - indirect or weaker relationship

★ ★ ★ ★ major tasks

B-1

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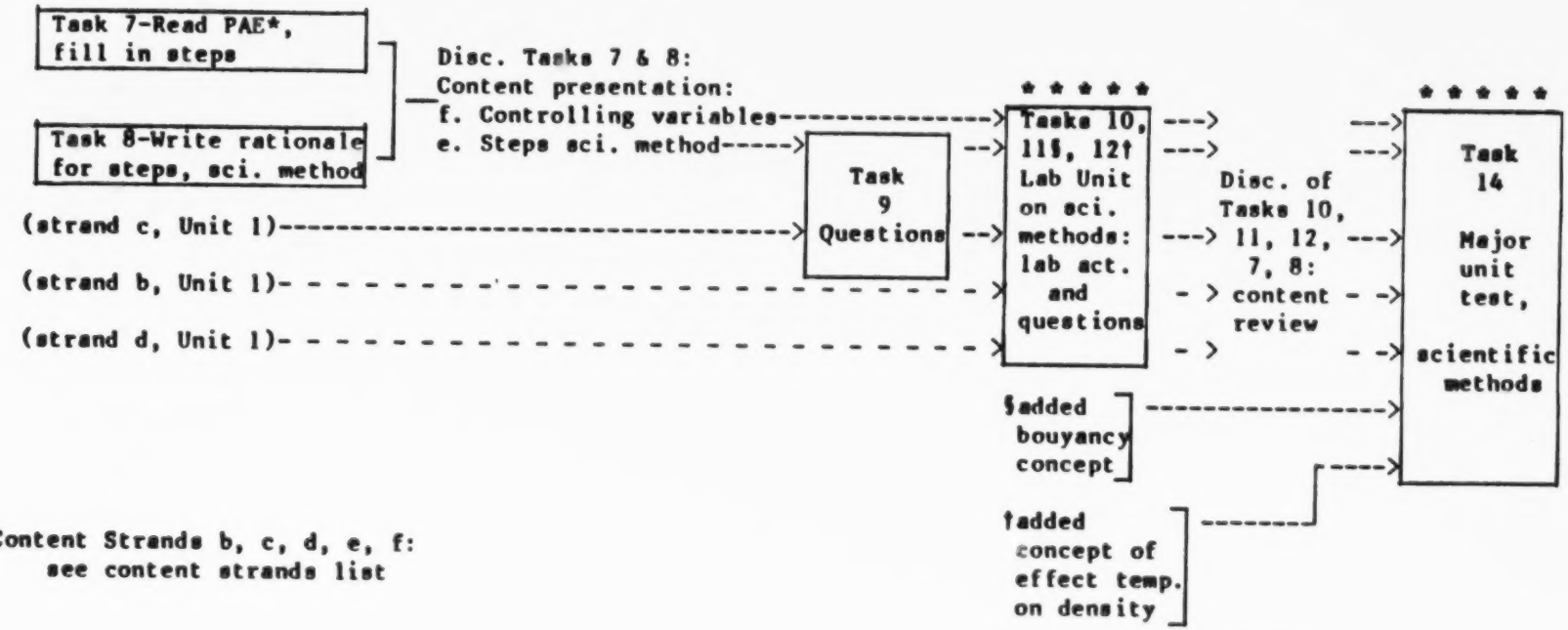
Figure 2
Flow Chart of Tasks and Content in Scientific Methods Unit
MAT Teacher 1, 2/9 to 3/3


Task 7-Read PAE*, fill in steps
Task 8-Write rationale for steps, sci. method
Disc. Tasks 7 & 8:
Content presentation:
f. Controlling variables
e. Steps sci. method
Task 9 Questions
(strand c, Unit 1)
(strand b, Unit 1)
(strand d, Unit 1)
Tasks 10, 11§, 12† Lab Unit on sci. methods: lab act. and questions
Disc. of Tasks 10, 11, 12, 7, 8: content review
Task 14 Major unit test, scientific methods
§added bouyancy concept
†added concept of effect temp. on density
Task 13 - Checking notebook (Proc. rel. to all tasks)

Content Strands b, c, d, e, f:
see content strands list

*PAE = handout, Performing An Experiment

Optional tasks related:
A1--directly to Tasks 7, 8, 14;
indirectly to 9, 10, 11, 12

A3--directly to tasks 11, 12;
indirectly to 7, 9, 1, 4

------- direct relationship
- - - - indirect or weaker relationship
* * * * major tasks

B-2

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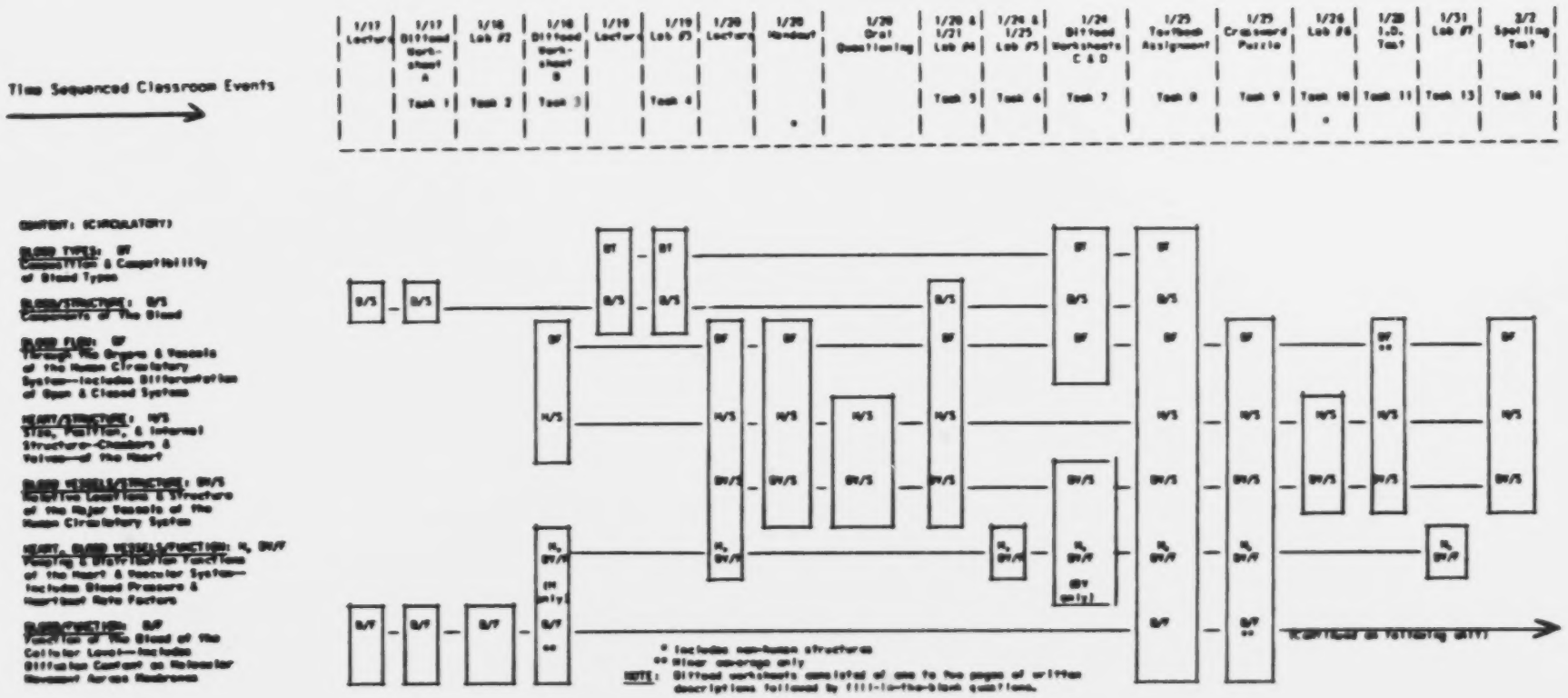
Flow Chart of Classroom Events and Content in the Circulatory Unit, 1-17 to 2-2-83
MAT Teacher 6



B-3

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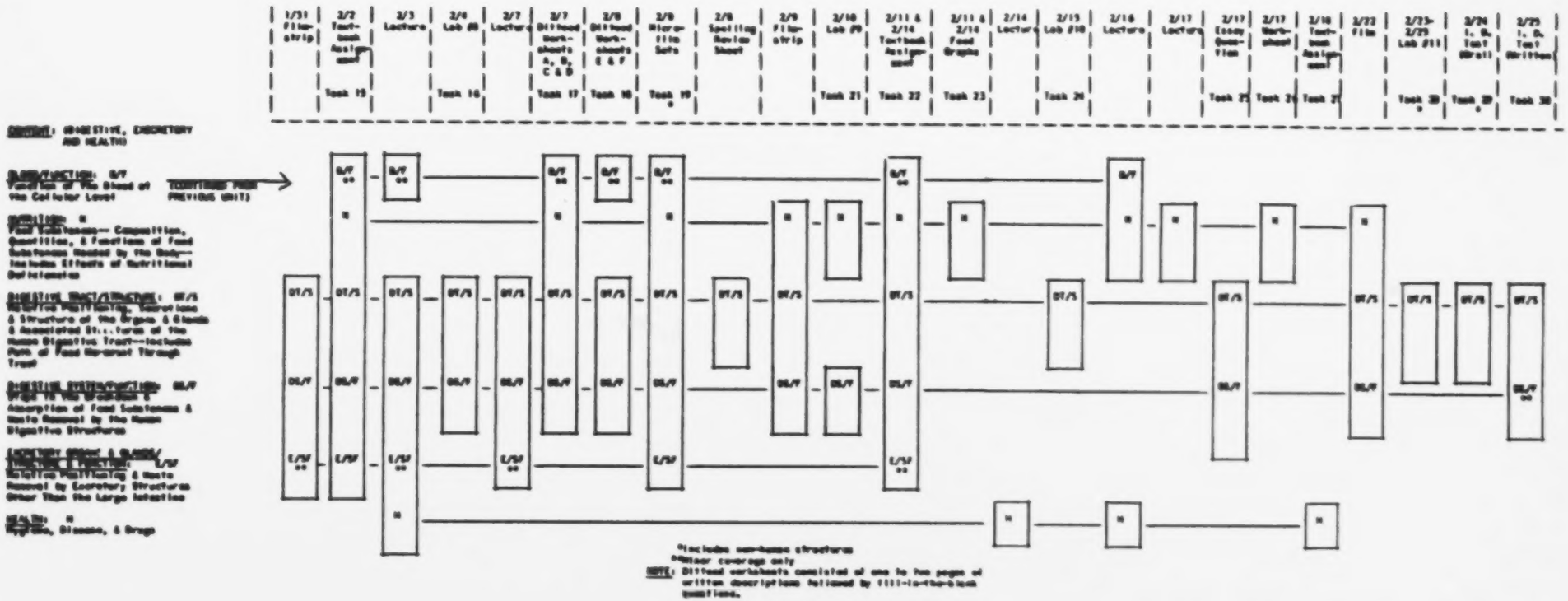
Flow Chart of Classroom Events and Content in the Digestive, Excretory, and Health Unit, 1-31 to 2-25-83, MAT Teacher 6


1/31 Film-strip
2/2 Text-book Assign-ment
Task 15
2/3 Lecture
2/4 Lab #8
Task 16
2/7 Lecture
2/7 Ditto-ed Work-sheets A, B, C & D
Task 17
2/8 Ditto-ed Work-sheets E & F
Task 18
2/9 Micro-slide Sets
Task 19
2/9 Spelling Review Sheet
2/9 Film-strip
2/10 Lab #9
Task 21
2/11 & 2/14 Text-book Assign-ment
Task 22
2/11 & 2/14 Food Graphs
Task 23
2/14 Lecture
2/15 Lab #10
Task 24
2/16 Lecture
2/17 Lecture
2/17 Essay Ques-tion
Task 25
2/17 Work-sheet
Task 26
2/18 Text-book Assign-ment
Task 27
2/22 Film
2/23-2/25 Lab #11
Task 28
2/24 I. D. Test (Oral)
Task 29
2/25 I. D. Test (Written)
Task 30
TOPICS: DIGESTIVE, EXCRETORY AND HEALTH
CLASSIFICATION: D/T Function of the Blood at the Cellular Level
CONTINUED FROM PREVIOUS UNIT
NUTRITION: N Food Substances-- Composition, Quantities, & Functions of Food Substances Needed by the Body-- Including Effects of Nutritional Deficiencies
DIGESTIVE STRUCTURE/FUNCTION: DT/S Relative Positioning, Structure & Structure of the Organs & Glands & Associated St...tures of the Human Digestive Tract--Including Path of Food Nutrient Through Tract
DIGESTIVE DYSFUNCTION: DS/F Effects of the Breakdown & Absorption of Food Substances & Waste Removal by the Human Digestive Structures
EXCRETORY STRUCT & FUNCT/ DYSFUNCTION & DYSFUNCT: E/ST Relative Positioning & Waste Removal by Excretory Structures Other Than the Large Intestine
HEALTH: H Hygiene, Disease, & Drugs
D/T
N
DT/S
DS/F
E/ST
*Includes warehouse structures
**Minor coverage only
NOTE: Ditto-ed worksheets consisted of one to two pages of written descriptions followed by fill-in-the-blank questions.

B-4

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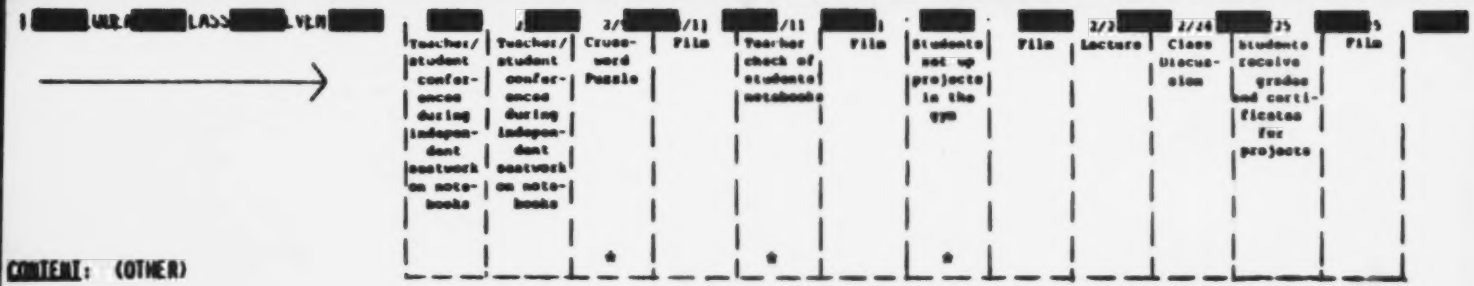


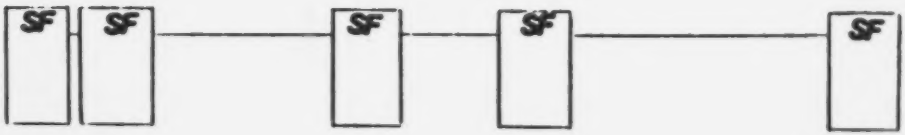
CONTENT: (OTHER)

REPTILES: R

General Survey.

SCIENCE FAIR: SF

Notebooks and Projects.



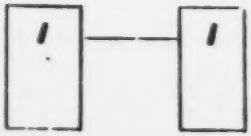
MOVE REMEDIES: HR

BLACK HISTORY: BH

Contributions made by Black Doctors and Inventors.

INSECTS: I

General Survey.



BACTERIA: B

Growth, Structure, and Function.

MISCELLANEOUS: M

Miscellaneous Collection of Biological and Non-biological Content.

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* Tasks

Content Strands for MAT Teacher 2 (Grade 7, English)

CONTENT STRANDS	First Week	Second Week	Third Week	Fourth Week	Fifth Week	Sixth Week
A. Spelling	Test 1	Test 2	Test 3 Unit 20 assign.	Test 4 Unit 21 assign.		Unit 22 Test
B. Writing	Tabs Test review Work on para. Topic sentence exercise	Reasons para. Compare/contrast para. Journal writing	Compare/contrast para. Journals "Changes" assign.	"Changes" writing assign. Compare/contrast para.	Compare/contrast para.	Compare/contrast para. Sentence fragments exercise
C. Vocabulary	Vocabulary quiz				Vocabulary assign.	
D. Grammar	Sentence diagramming	Diagramming	Diagramming	Pronouns exercise		Parts of speech review
E. Punctuation	Comma rule 7 quiz	Comma rules Capitalization Punctuation	Capitalization Comma test Capitalization exercise	Capitalization quiz 1	Capitalization	Capitalization quiz 2
F. Literature				"My Father..." (story)	"My Father..." (story)	Reaction paper to "My Father..." (story)

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(rounded box) = Major (rectangle) = Minor Unmarked = Topic, not tasks

Content Strands for MAT Teacher 3 (Grade 8, English)

CONTENT STRANDS	First Week	Second Week	Third Week	Fourth Week	Fifth Week	Sixth Week
Journals	Daily Entries	Journals Graded [1]	Daily Entries	Daily Entries	Daily Entries	Daily Entries
Writing (Perfect Paragraph)	Intro**	**	**	**	P Paragraph collected [1]	
Grammar (Pronoun & Verb Usage)	Pronoun exercises	PN test [1]	Pronouns & Verbs	Verb Charts	Pronouns & Verbs	Language Test [2*]
Spelling	Spelling HW	Test 1 [2*]	Test 2 [2*]	Test 3 [2*]	Test 4 [2*]	Spelling Bee	50 Word Test [1]
Notebook Test	Daily Work	Daily Work	Daily Work	Daily Work	Daily Work	Notebook Test [1]
Literature	Read Story	Quiz on Story [3]				

[1] Major grade for the six weeks

[2] Grade averaged with others for a major grade

[3] Graded work but grade not averaged for a six-week grade

*Note: The language test and the 4 weekly spelling tests were averaged to equal one major test grade.

**Note: On the first four Thursdays of the term, perfect paragraphs could be handed in for correction and feedback.

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Content Strands for MAT Teacher 5

January 17-21

	Monday (Sub.)		Tuesday					Wednesday				Thursday			Friday				
	ApT	RvT	ApT	CI	RfT	RvT	AsT	ApT	RfT	CI	RfT	ApT	RfT	Video-Tape	ApT	CI	RfT	CI	RfT
Unlike Signs																			
Rounding Off																			
Exponents																			
LCM																			
Adding Fractions																			
Subtracting Fractions																			
Adding Decimals																			
Subtracting Decimals																			
Prime Factors																			
Multiplying Fractions																			
Dividing Fractions																			
Multiplying Decimals																			
Dividing Decimals																			
Fractions-->Decimals																			
Decimals -->Fractions																			
Fractions-->Percent																			
Decimals -->Percent																			
Percent -->Fractions																			
Percent -->Decimals																			
Solving for Part																			
Solving for Percent																			
Solving for Whole																			

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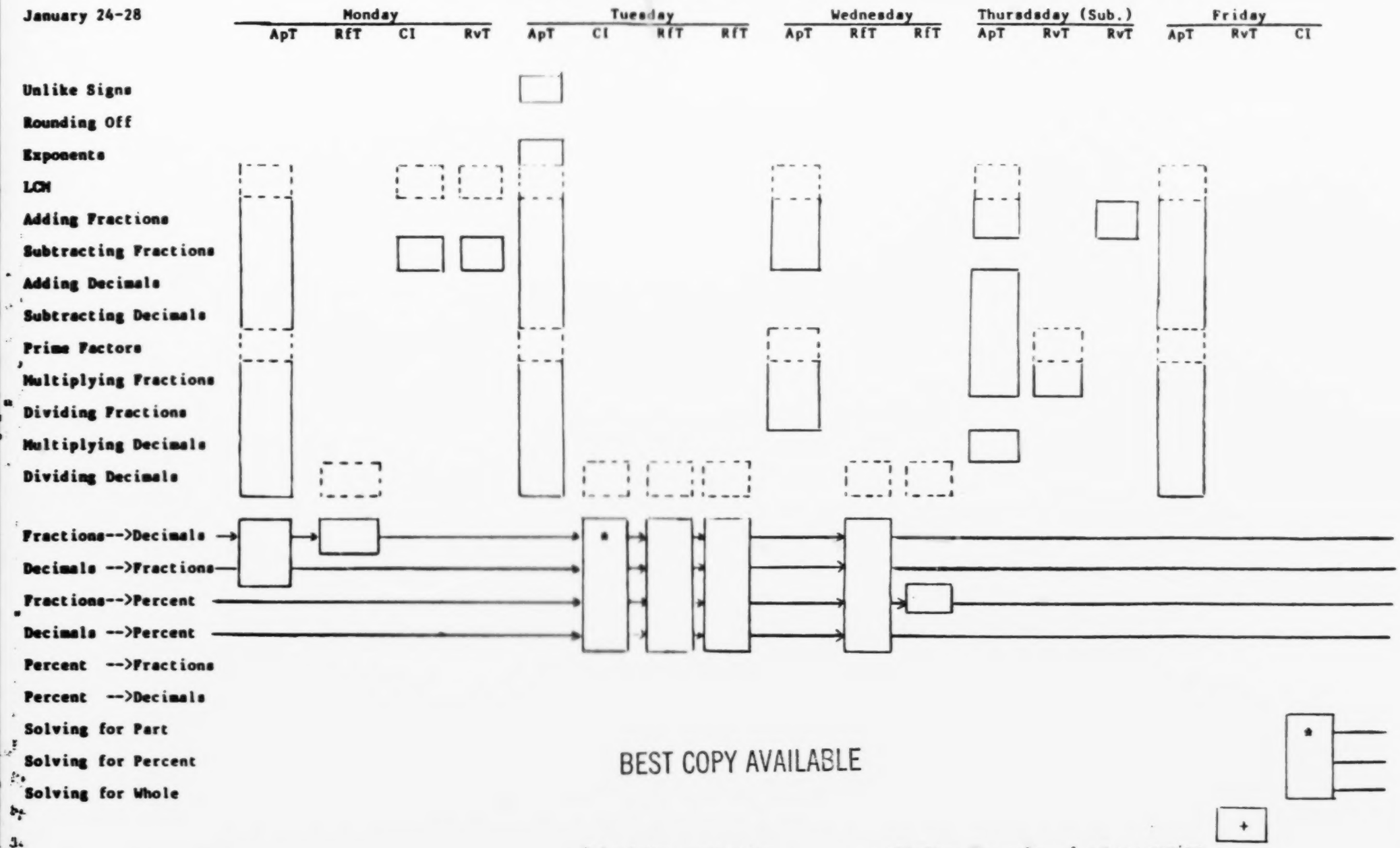
§ Compared Fractions, Decimals and Percent but didn't explain how to do problems.

Content Strands for MAT Teacher 5, cont.



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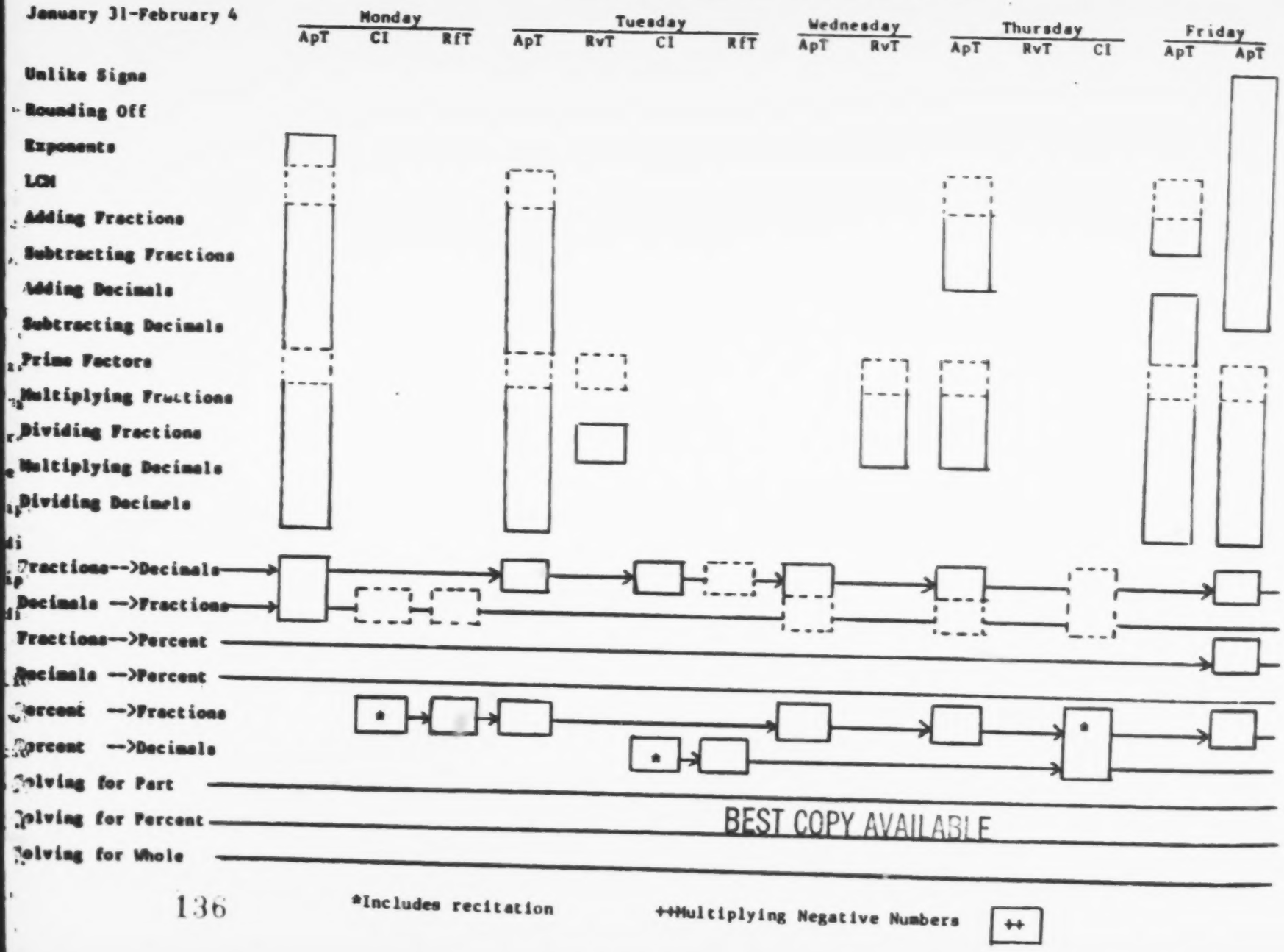
* Includes recitation

+Finding the value of an expression

Content Strands for MAT Teacher 5, cont.



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*Includes recitation

++Multiplying Negative Numbers ++

ruary 7-11

Monday		Tuesday				Wednesday				Thursday			Friday			
Video-Tape	ApT	ApT	RvT	RvT	CI	ApT	RvT	CI	RvT	ApT	RvT	RvT	ApT	RvT	CI	RfT

he Signs

ding Off

ents

g Fractions

cting Fractions

Decimals

cting Decimals

Factors

lying Fractions

ng Fractions

lying Decimals

ng Decimals

ons-->Decimals

ls -->Fractions

ns-->Percent

ls -->Percent

-->Fractions

-->Decimals

ng for Part

g for Percent

ng for Whole

= Videotape on Social Skills and Thought Page with Discussion

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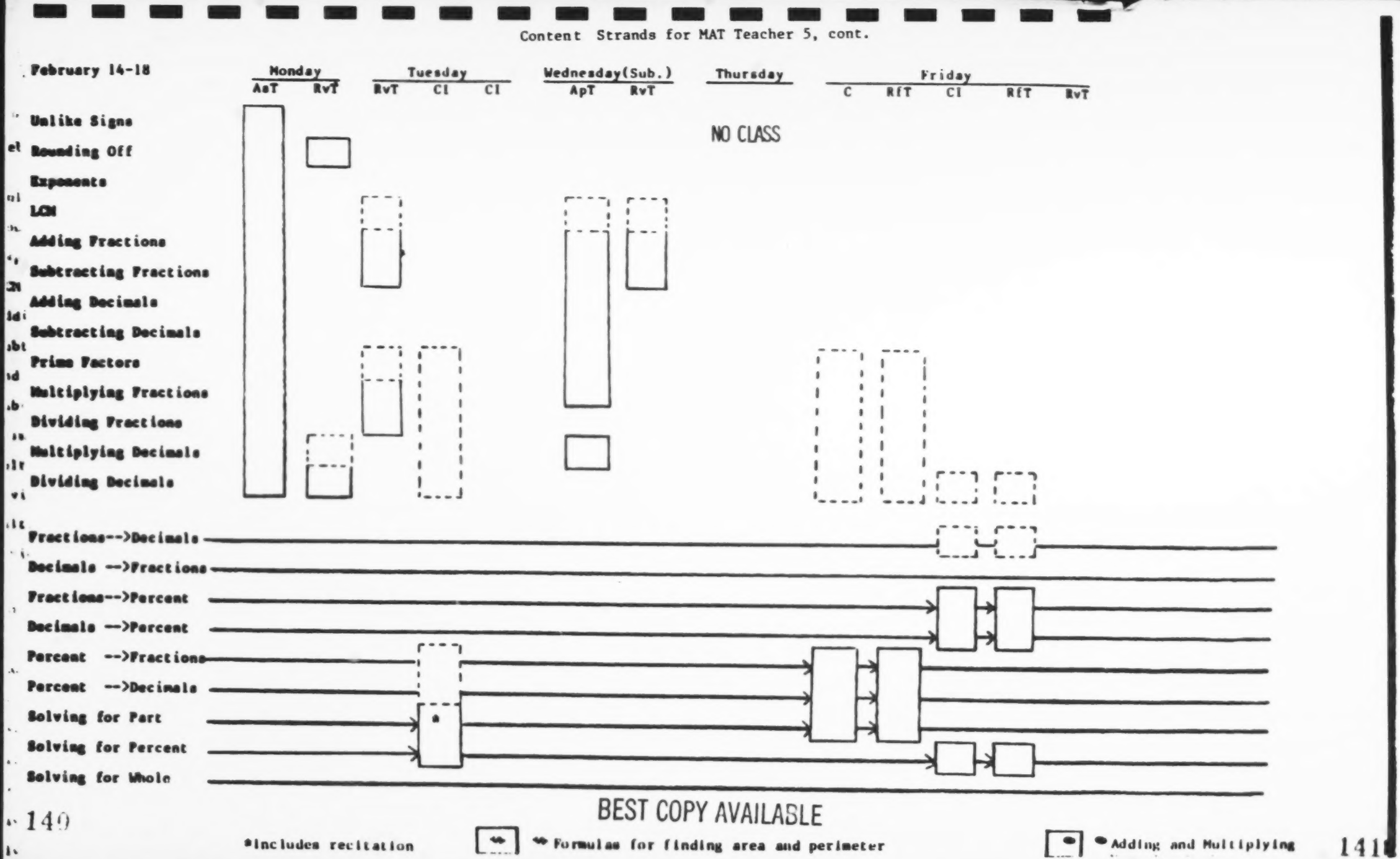
Content Strands for MAT Teacher 5, cont.



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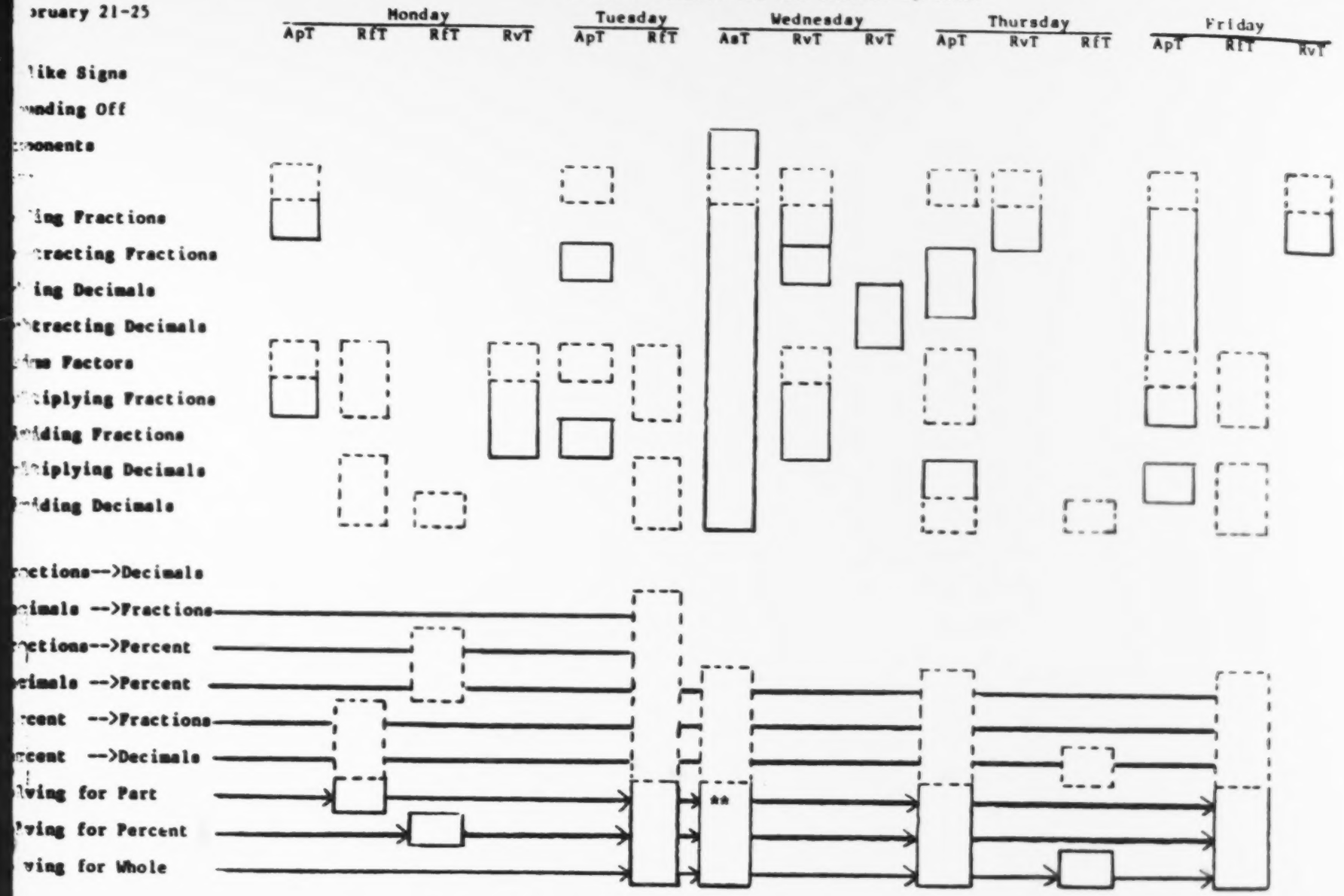
*Includes recitation

Formulas for finding area and perimeter

Adding and Multiplying

Content Strands for MAT Teacher 5, cont.



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**Bonus Problems